Economic Impact of Offshore Oil and Gas Development on Nova Scotia, 1990 - 2000

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Prepared by:

Gardner Pinfold Consulting Economists Limited

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Acronyms and Definitions

Cohasset-Panuke	Cohasset-Panuke Oil Development Project
Direct Impacts	the income and employment arising from expenditures for labour, materials and services made to construct and operate a project.
GDP	Gross Domestic Product, the value of the final goods and services produced within a given geographic area such as the province of Nova Scotia valued at market prices. It may be expressed as GDP at factor cost. This measure differs from the more prevalent *market price* measure found in the income and expenditure accounts by its exclusion of taxes on production (formerly called indirect taxes) and the inclusion of subsidies. Note that GDP can be measured on an income basis where it normally includes: wages, salaries, and supplementary labour income; net income of unincorporated businesses; corporate profits before taxes; interest and miscellaneous investment income; inventory valuation adjustments; and, capital consumption allowances.
GST	Goods and Services Tax, the 7% sales tax levied by the federal government.
Household income	this term usually means the gross wages and salaries and supplementary labour income earned by the people employed by a project. It includes income taxes, employment insurance, pension fund contributions, etc. It can apply to direct or spinoff employment. Household income is part of GDP.
HST	Harmonized Sales Tax, the combined federal sales tax and provincial sales tax levied at 15% in Nova Scotia, New Brunswick and Newfoundland.
Indirect Impacts	the income and employment generated through the purchase and production of goods and services triggered by the purchase of materials and services at the direct stage; this is sometimes referred to as the inter-industry linkages.
Induced Impacts	the income and employment generated by the (re)spending the incomes earned at the direct and indirect stages on consumer goods and services. Input-Output models trace these impacts through the iterative rounds of spending to estimate the cumulative impacts.
NGL	natural gas liquids
NSIO	Nova Scotia Input-Output Model
Person year	the term that applies to one person working for one full year. The SOEP SEIS used 2,080 hours as the measure of one person year. This amounts to 52 40-hour weeks of work.
PST	the provincial sales tax that was applied to selected items prior to the implementation of the HST.
SEIS	Socio-Economic Impact Statement
SOEP	Sable Offshore Energy Project
Spinoff Impacts	the combination of indirect and induced impacts.

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Executive Summary

The purpose and objectives of this study are:

- to prepare a comprehensive, documented report that describes and quantifies the economic impact that development and production of offshore oil and gas has had on the economy of Nova Scotia over the period 1990-2000, and
- to provide an assessment of lessons from this experience to support provincial planning in the future.

Policy Framework

The Canada-Nova Scotia Offshore Petroleum Resources Accord and the implementation Acts guide offshore petroleum exploration, development and production in Nova Scotia. The Acts stipulate that Nova Scotia industry must be given a "...full and fair opportunity" to compete for contracts. The "Benefits Plan" that must be submitted for any exploration or field development expresses an operator's commitment to the principles of providing "full and fair opportunity and first consideration in procurement, employment research and development" for Nova Scotians. The Canada-Nova Scotia Offshore Petroleum Board reviews and accepts the Benefits Plans submitted by operators and then monitors the results of implementation.

Offshore Projects

By the end of 2000, the Nova Scotia offshore had two actual offshore petroleum project developments. The Cohasset-Panuke project was a small oil field development that produced about 7.2 million cubic meters (45 million barrels) over a seven-year period beginning in 1992. The Sable Offshore Energy Project (SOEP) started to produce natural gas and natural gas liquids at almost the same time as Cohasset oil production ceased in late 1999. The SOEP is expected to continue producing gas at a rate of about 15.6 million cubic meters (550 million cubic feet) of gas per day and about 3,180 cubic meters (20,000 barrels) per day of natural gas liquids for a period of about 25 years.

Expected and Actual Impacts [1]

The actual impacts of Nova Scotia offshore activities and related activities during 1990-2000 exceeded the expected impacts in all cases except the Maritimes & Northeast Pipeline laterals (Table E-1). For example, SOEP expected spending was estimated at $1.6 billion of which $547

[1] Expected refers to ex-ante impact estimates made using planned expenditures for a project or activity before the project has been implemented. Actual refers to ex-post estimates of economic impact based on actual expenditures reported for a project or activity.

million was to be spent in Nova Scotia with a total expected Gross Domestic Product (GDP) impact at $590 million and associated employment impact of 11,100 person years. Actual development spending reached almost $2.3 billion[2] of which $712 million occurred in Nova Scotia, with an actual GDP impact of $773 million and employment impact of 14,460 person years.

Table E-1
Economic Impacts for Nova Scotia Offshore related Projects
Expected and Actual, 1990 – 2000

	Cohasset-Panuke		SOEP		M&NP Main Pipeline[5]		M&NP Halifax, Point Tupper Laterals		Exploration	
	Expected	Actual	Expected	Actual	Expected[3]	Actual	Expected	Actual	Expected[4]	Actual
Development										
Expenditure[1] ($ million)										
-Total	160	498	1,600	2,282	544	743	75	93	na	280
-Nova Scotia	60	184	547	712	na	183	42	53	na	93
GDP ($million)	34	212	590	773	98	231	52	67	na	81
Employment (person years)	1,280	3,080	11,100	14,460	810	2,770	985	820	na	1,300
Operations										
Expenditure ($ million)										
-Total	71	110	64	133	na	na	na	na	na	na
-Nova Scotia	23	43	47	67	na	na	na	na	na	na
GDP ($million)[2]	14	50	50	81	na	na	na	na	na	na
Employment (person years)	340	700	1,030	1,670	na	na	na	na	na	na

Source: Gardner Pinfold ConsultingEconomists Limited

Notes

1. The expenditures and impacts of the projects were reported sometimes in constant dollars and sometimes in current dollars. This distinction is ignored here because the 1990s was a decade of relatively low inflation (applies to Cohasset-Panuke) or the Expected and Actual impacts are close in time (SOEP, pipelines).

2. This comparison excludes the direct impact of the net sales of oil, natural gas and natural gas liquids since these were not part of the original Expected estimates.

3. The Expenditure figure covers the complete pipeline. No expected impacts are given for Nova Scotia. The Expected GDP and employment impacts only cover direct and indirect impacts unlike the Actual impacts which include direct, indirect and induced.

4. Reported for completeness; there were no Expected estimates made.

5. Expected pipeline employment impacts that were reported in terms of jobs have been converted to person years at the rate of 1.35 jobs per person year.

na - not available or not calculated.

Impacts over Time

The aggregate annual contribution of offshore oil and gas activities to provincial GDP from 1990 to 2000 remained in the $120 million range, until the effects of SOEP began in 1997. (Figure E-1) The peak GDP contribution during the study period was about $1.2 billion in 2000, the first full year of SOEP natural gas production when GDP contribution was dominated by the sales value of natural gas and natural gas liquids. Employment follows a similar pattern up to 1998 and tops out at over 11,000 person years in 1999, the peak of SOEP construction and construction of the M&NP main pipeline.

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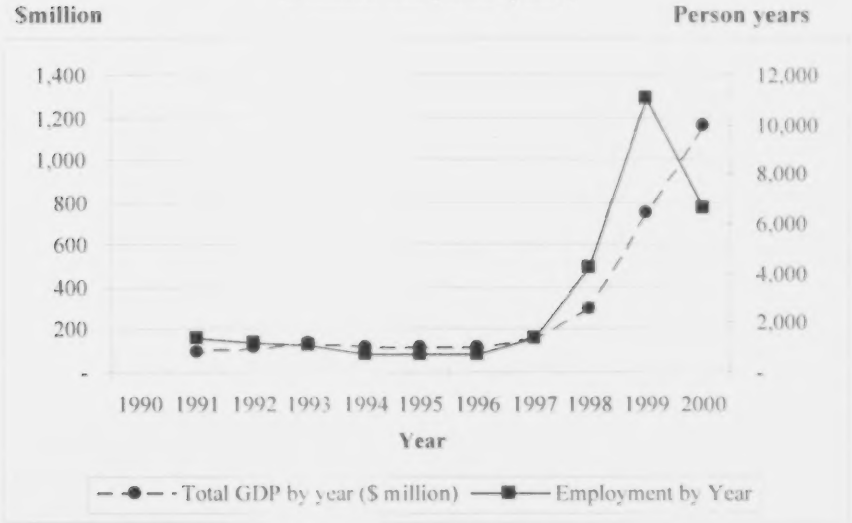
2 In the SOEP SEIS, it appears, although the wording is imprecise, that the $1.6 billion expenditure was meant to cover what are now called Tier 1 and Tier 2; that is, the complete project. Now, ExxonMobil estimates that Tier 2 alone will be a $1 billion investment, bringing the total SOEP investment cost to about $3.2 billion, or double the original estimate.

Figure E-1
Offshore Oil and Gas Projects
Contribution to Nova Scotia GDP and Employment
($ million and person years)



Source: Gardner Pinfold Consulting Economists Limited

Impacts in Economic Context

The estimated annual direct contribution to Nova Scotia GDP from SOEP gas production in 2000 was about $810 million, of which $780 million was the estimated net sales revenue after operating costs. Most of this net revenue accrued to non-resident owners outside the province, so it passed through the provincial economy without registering any substantial spinoff impacts. The total annual in-province GDP impacts during production were estimated to be about $81 million. Over 25 years, the present value of these GDP impacts, at a 7% discount rate, exceeds $940 million, about $130 million greater than the total development phase GDP impacts of $770 million. To put things in perspective, annual total GDP for Nova Scotia grew from $18.3 billion in 1997 to over $20.3 billion in 2000, the same time frame as the SOEP impacts occurred. In 2000, agriculture, forestry and fishing contributed about $520 million to provincial GDP, compared with the direct $810 million contribution by natural gas production (about 4% of GDP).

The major employment impacts of offshore activities occurred during the development phase and lasted only one or two years. SOEP production phase direct employment runs at about 310 people, compared with direct employment at each of the three Michelin operations, which exceeds 1,000 people per plant.

Total provincial tax collections during 1990-2000 directly attributable to the offshore projects, including royalties, HST, licenses and forfeitures and corporate income tax, but not personal income tax, amounted to a little over $53.8 million, of which royalties provided $32 million. After the equalization offset, Nova Scotia retained slightly more than $35.2 million on a net basis.

The estimated upper bound for gross provincial tax revenue over the study period, including personal and corporate income tax, is $211 million. About 47% of the revenue or $99 million was generated directly by the various offshore activities analyzed in this report. (SOEP, the Cohasset-Panuke project, the Maritimes & Northeast mainline and laterals projects, and the Deep Panuke project and other exploration drilling). The remaining 53% came from the spinoff activities.

Municipal tax revenues generated by taxing the gas pipelines amounted to $6.5 million in 2000 and increased to $10.1 million in 2001. These were especially important to communities in Guysborough County where there is a narrow tax base.

Nova Scotia Content

During the study period, 1990-2000, Nova Scotia content (spending in Nova Scotia as a percentage of total project expenditure) was 30-40% of total development phase expenditure and 35-50% for production phase expenditure. This level of participation could increase in future developments as Nova Scotia businesses gain more experience with the offshore and Nova Scotia's capabilities to supply goods and services and skilled labour are enhanced. SOEP production phase employment runs at about 90% Nova Scotia residents.

The offshore has been the source of important business opportunities for some Nova Scotia companies to supply goods and services to local offshore developments as well as to expand into export markets. The intermittent or cyclical nature of the Nova Scotia offshore so far means that few businesses could exist on offshore work alone. Development of additional commercial fields is essential before Nova Scotia could be said to have an offshore industry rather than a series of offshore projects.

Over 90% of the value of contracts awarded to Nova Scotia companies for the SOEP ($731 million out of $795 million to the end of 2000) went to companies and organizations located in the Halifax Regional Municipality. Other impact areas were Guysborough County, where the offshore pipeline landfall and the gas processing plant are located and the Mulgrave-Port Hawkesbury area where the liquids fractionation plant is located, as well as an offshore supply vessel base and machine shop.

Adequate Information

Available public information to assess the economic impacts of offshore development in Nova Scotia is relatively scarce. Generally, the planning stage information submitted to Environmental and Socio-Economic Impact Assessment hearings, to the National Energy Board for pipeline approval and rate setting, and to the Canada-Nova Scotia Offshore Petroleum Board for its various license, permits and the Canada-Nova Scotia benefits process is more informative than the publicly available information on actual impacts and benefits produced. The main source of actual project-activity data is the Canada-Nova Scotia Benefits reports that provide a general description of actual spending and employment in aggregate terms broken down into Nova Scotia, other Canadian and foreign content. There are no targets set for Nova Scotia content in either aggregate or specific terms. The only appropriate measure is to compare actual results with the planning stage estimates. This is the approach adopted in this study.

Looking to the Future

It has taken between 20 and 30 years following the initial discoveries of oil and gas to bring Cohasset-Panuke and SOEP into production. Very little exploration work took place during the 1990s other than what was associated with those two projects. The next known stage of offshore development in Nova Scotia will be the expansion of the SOEP during 2003-2007 as the Tier 2 fields – South Venture, Glenelg and Alma – are brought into production. The Deep Panuke project will produce sour gas from deep gas fields that lie beneath the original Panuke oil field, notably with just a six-year lag between discovery and production. Further development of the Nova Scotia offshore depends largely on successful exploration programs finding additional commercial gas or oil reserves. The industry experience gained over the last decade of the 20th century and the early 21st century has provided a solid base on which to build a future industry.

Recommendations

The findings of the study lead to the following two recommendations.

1. *As an equal partner in the Canada Nova Scotia Offshore Petroleum Board, Nova Scotia should work to persuade the Board that more appropriately aggregated information on the spending for offshore work be made accessible for the conduct of comprehensive analysis of the economic impact of the offshore energy sector.*
2. *Create and maintain a set of offshore petroleum satellite economic accounts to get a true and complete picture of the importance of the offshore oil and gas sector to the Nova Scotia economy.*

1. Background

Development of Nova Scotia's offshore energy resources is a pivotal feature of the economic policy of the Government of Nova Scotia. The Province's Economic Growth Strategy, *Opportunities for Prosperity* (October 2000), identifies offshore energy as one of the five sectors in which the province will focus its efforts to capture growth opportunities. In addition, the discussion paper on the Province's Energy Strategy, *Powering Nova Scotia's Economy* (March 2001), states that "the potential for long-term growth from offshore development, particularly natural gas, has increased dramatically…. This is a major domestic and export opportunity that is changing the dynamics of the province's commercial and industrial sectors." One of the strategic goals of the province's energy sector is "to optimize financial, economic and social benefits in the province's rapidly expanding offshore energy sector".

Production of oil and gas from Nova Scotia's offshore hydrocarbon reserves has now been under way for a decade. Further development of, and production from natural gas fields is anticipated in the near future.

Still, a clear and widely held understanding of the importance of offshore oil and gas development to the Nova Scotia economy is lacking. Moreover, measurement of the impact of offshore energy on the economy has been neither comprehensive nor systematic. The most comprehensive work has been the *ex-ante* studies prepared for the socio-economic and environmental impact assessments submitted to the review process for the Cohasset-Panuke Project and for the Sable Offshore Energy Project (SOEP) (Tier 1). The seven-year production life of Cohasset-Panuke ended in December 1999 and production from the SOEP started in the same month. Limited information does exist, for example, through the periodic published benefits reports. During the 1990s, however, the discussion in the economic commentaries has been typically incomplete and piecemeal as it relates to the economic impact on Nova Scotia of these projects through their development and production phases. To date, no full, documented account exists describing what the economic impact has been.

Preparing a comprehensive examination of this experience in Nova Scotia is both timely and desirable, as the province moves into its second decade of offshore energy development and production. Indeed, such a study is called for in Volume 2 of *Seizing the Opportunity, Nova Scotia's Energy Strategy*. A broad study of the economic impact on Nova Scotia from the

development of the offshore energy sector through the 1990s would provide a useful reference document to improve public understanding and to support the planning initiatives by the Government of Nova Scotia.

Hence, the purpose and objectives of this study are:

- to prepare a comprehensive, documented report that describes and quantifies the economic impact that development and production of offshore oil and gas has had on the economy of Nova Scotia over the period 1990-2000, and
- to provide an assessment of lessons from this experience to support provincial planning in the future.

Time Frame and Scope

Consistent with the first objective, it should be noted that this study covers the period January 1, 1990 to December 31, 2000. Some reference is made to events taking place since the study end date, but this is for purposes of context only. The study undertook no data collection or analysis of post-2000 activities.

The study focuses exclusively on identifying and measuring the economic impacts of offshore petroleum activities that actually occurred during 1990-2000. Consequently the study excludes any data collection or analysis related to a natural gas distribution system. Furthermore, since its focus is on economic impacts and the information available to measure them, the study does not attempt to assess the pros and cons of the Province's energy policies, or the Energy Strategy itself.

2. Policy Context

This section describes the policy context for the Nova Scotia offshore. This will include a summary description of the relevant section of the Canada-Nova Scotia Accord, particularly Section 45 that lays out the requirements for a Canada-Nova Scotia Benefits Plan for oil and gas activities. Also relevant will be the Industrial Benefits Information Bulletin, published in 1999 by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB, also referred to as the Board) and a discussion of the regulatory regime also produced by the Board. It will also be useful to note briefly the role played by Nova Scotia Resources Limited and the establishment of a petroleum resource royalty framework. The latter will be dealt with more fully in a later section.

Nova Scotia

Petroleum rights are issued and administered in Nova Scotia by the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB). This independent joint agency with a four-member Board was established in 1990. Its powers derive from the Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act S.C. 1988 c.28 (federal government) and the Canada-Nova Scotia Offshore Petroleum Resources Accord implementation (Nova Scotia) Act S.N..S. 1987 c.3. For ease of reference, we will refer to these two Acts as the Accord. The Board is charged with regulation of petroleum activities in the Nova Scotia offshore area and its responsibilities, as cited in the Board's 1997 Annual Report, include:

- ensuring compliance with the provisions of the Accord Acts that deal with Canada-Nova Scotia employment and industrial benefits;
- management and conservation of offshore petroleum resources;
- rights issuance and management;
- protection of the environment during offshore petroleum activities;
- enhancement of safe working conditions for offshore operations;
- resource evaluation; and,
- data collection, storage and distribution.

The Board's procedure for managing the offshore consists of:

- Call for Nominations

  Interested parties are provided with the opportunity to nominate crown reserve lands for inclusion in a Call for Bids.

- Plan for Interests

  The Board submits plans for leasing of offshore petroleum rights for approval to the provincial and federal Ministers.

- Call for Bids

  Upon receiving Ministerial Approval, the Board initiates a Call for Bids for Exploration Licenses specifying either a cash bonus bid or a work expenditure bid criterion for assessing bids. The cash bonus bid is the dollar value that a bidder will pay to acquire a particular license. The work expenditure bid is the sum of money a bidder commits to spend on exploration within the first period of the term of the Exploration Licence.

- Exploration License

  Exploration licences have a maximum term of nine (9) years, consisting of five (5) and four (4) consecutive years respectively. The licensee must drill or spud one exploratory well on or before the expiry date of the first period. Annual rentals apply to the second period.

- Significant Discovery License

  The Board issues a Declaration of Significant Discovery if a drilling program results in a significant discovery. This entitles the licensee to hold rights to a discovery area while the extent of that discovery is determined or until commercial development becomes viable.

- Production License

  When the Board declares a commercial discovery, the licensee is entitled to a Production Licence subject to the approval of a development plan and a benefits plan. The Production Licence is issued for a period of twenty-five (25) years and for the duration of commercial production.

Canada-Nova Scotia Benefits

For the public, the main interest in offshore activities often focuses on the associated 'benefits', often referred to as the Canada benefits or Nova Scotia benefits. The term 'benefits' is usually taken to mean employment directly in offshore activities or the supply of goods and services required by those activities that would create indirect employment.

In this regard, the Accord, which governs offshore exploration and development, stipulates that any proposed offshore project must file a Canada-Nova Scotia benefits plan that[3]:

- Contains a plan for the employment of Nova Scotians in particular and Canadians in general;
- Provides manufacturers, consultants, contractors and service companies in Nova Scotia and other parts of Canada with a full and fair opportunity to participate on a competitive basis in the supply of goods and services used in any proposed work or activity referred to in the benefits plan;
- First consideration shall be given to services provided from within Nova Scotia and goods manufactured in Nova Scotia, where those goods and services are competitive in terms of fair market price, quality and delivery;
- A company proposing a benefits plan shall establish an office in Nova Scotia where appropriate levels of decision making will take place prior to carrying any work or activity in the offshore area;
- Individual residents of Nova Scotia shall be given first consideration for training and employment in the work program covered by the benefits plan, in a manner consistent the *Canadian Charter of Rights and Freedoms*. This provision shall cover any collective labour agreement entered into by the company proposing the plan;
- The plan shall provide for a program and expenditures for the promotion of education and training and research and development in Nova Scotia related to petroleum resource activities in the offshore area; and,
- The Board may require that any benefits plans contain an affirmative action program to ensure that disadvantaged individuals or groups have access to training and employment opportunities or the supply of goods and services used in any proposed work or activity referred to in the benefits plan.

The term "...full and fair opportunity" is a key phrase although the Accord does not stipulate what "full and fair" means. This is left to the interpretation of the Board. The economic impacts on the Nova Scotia economy presented later in this report can be considered the result of how the Board has applied the "full and fair" test.

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[3] See Section 45 of the *Canada-Nova Scotia Offshore Petroleum Resources Accord Implementation Act*.

Nova Scotia Resources Limited

Through the 1980s Nova Scotia attempted to create an equity stake in the province's budding offshore petroleum sector. This was done through the creation of a provincial Crown corporation, Nova Scotia Resources Limited (NSRL). When NSRL was created, the Nova Scotia government provided loan guarantees to back the company's borrowing in the capital markets. NSRL accumulated debt in the $800 million range over its operating life. Perhaps NSRL's most well-known investment was its 8.4% share in SOEP, the province's first commercial gas development. The Province has sold NSRL, including the share in SOEP.

Royalty Regime

To foster some stability for the operators of offshore oil and gas projects, the government of Nova Scotia created a royalty regime. This regime specified what royalty payments operators would have to make on the sales of oil or gas produced from Nova Scotia's oil and gas reserves. A specific royalty regime was developed first for the Cohasset-Panuke project. This was followed with a specific royalty regime for the SOEP. Now a generic royalty regime has been created that will apply to all future oil and gas developments. The royalty regime and royalty payments are examined as part of the assessment of economic impacts.

3. Offshore Petroleum Developments of the Last Ten Years

3.1 Background

The history of Canadian offshore petroleum developments spans about forty years, although it is only over the last decade that the activity has gained intensity. Offshore oil and gas activity began on the west coast in 1958 when the first seismic program was conducted in the Queen Charlotte Basin north of Vancouver Island. A drilling program did start up in the area, but all activity ceased in the early 1970s when the Government of Canada and the Province of British Columbia imposed a moratorium on all offshore oil and gas activities that is still in force today[4]. On the East Coast, Mobil Oil Canada received its first offshore license in 1959 for the Sable Island block off Nova Scotia. Mobil began its first seismic program in 1960 and followed this with a drilling program in 1967.

Up to the end of 2000 in the Nova Scotia offshore area, the petroleum industry has acquired several hundred thousand km of seismic data and has drilled some 136 exploration/delineation wells (Table 3-1). Drilling activity has varied in intensity over the years, with success the main driver in the number of exploratory wells drilled. Of the 72 exploration and delineation wells drilled during the late 1960s and 1970s, eight resulted in Significant Discoveries.

Combined with incentives under the National Energy Program, this success provided the impetus for another 52 exploration and delineation wells in the 1980s. These resulted in a further 14 Significant Discoveries. Most of these are relatively small, yet potentially economic, gas fields. Exploration activity during the 1990s was relatively light, with nine wells drilled. This drilling activity did lead to the discovery of the Deep Panuke natural gas field. Still, activity during the 1990s was dominated by field development, with a total of 39 wells drilled for the Cohasset-Panuke (27) and SOEP (12) projects.

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[4] The Province of British Colombia is currently in talks with the federal government to lift the moratorium.

Table 3-1
Exploration Activity on the Scotian Shelf, 1960-2000

Years	Wells Drilled				Significant Discoveries
	Exploration	Delineation	Development	Total	
1960-1969	3	-	-	3	1
1970-1979	56	13	-	69	7
1980-1989	39	13	-	52	14
1990-2000	9	3	39	51	*
Total	107	29	39	175	22

* This is to note the Deep Panuke well did not qualify under the CNSOPB definition of a Significant Discovery, although development will proceed based on its commercial potential.

Source: Canada-Nova Scotia Offshore Petroleum Board, Directory of Offshore Wells, Revised June 2002.

The Significant Discoveries (plus Deep Panuke) contain estimated recoverable reserves of just over 170 million cubic meters (6 trillion cubic feet) of natural gas, and 35 million cubic meters (220 million barrels) of oil and condensate[5]. The Geological Survey of Canada (CNSOPB, 2000) estimates these discoveries represent about one-third of the discovered and potential undiscovered gas resources, estimated at about 510 million cubic meters (18 trillion cubic feet), and 20% of the oil and condensate resources, estimated at 175 million cubic meters (1.1 billion barrels), predicted to exist in Nova Scotia's offshore area. Gas resources in the Laurentian Sub-basin are estimated at 226-255 million cubic meters (8-9 trillion cubic feet). These estimates are now being updated.

3.2 Nova Scotia

Nova Scotia offshore oil and gas activities have occurred over the last 40 years, with the first wells – Sable Island, Onondaga and Oneida – drilled in 1969-1970. Table 3-2 shows highlights of industry development.

[5] All conversions are made using 35.3123 cubic feet per cubic meter and 0.158987 barrels per cubic meter.

Table 3-2
Chronology of Offshore Oil and Gas Development in Nova Scotia

Year	Event
1969-1970	➢ First wells drilled – Sable Island, Onondaga and Oneida
1971	➢ First significant oil and gas find, Mobil Oil, Sable E-48 well.
1973	➢ Cohasset oil field discovered
1979	➢ Venture natural gas field drilled and declared to have commercial potential.
1982, 1986	➢ Canada-Nova Scotia Accords put in place to cover offshore oil and gas resource management and revenue sharing.
1987, 1988	➢ Canada-Nova Scotia Accord Implementation Acts passed by federal and provincial governments
1990	➢ Canada-Nova Scotia Offshore Petroleum Board established to manage offshore petroleum resources on behalf of both the federal and provincial governments.
1992	➢ Oil production started from the Cohasset-Panuke project
1996	➢ Fiscal negotiations began for the Sable Island natural gas project.
1997	➢ Royalty regime concluded with the SOEP proponents
1998	➢ Generic royalty regime approved
1998	➢ Construction started for the Sable Offshore Energy Project (SOEP)
1998	➢ Deep Panuke exploration well (PP-3C) and delineation well (PI-1B) drilled
December 1999	➢ Production ceased from the Cohasset-Panuke project
December 1999	➢ Production of Sable gas commenced
2000	➢ Delineation wells (M-79A, H-08) drilled for Deep Panuke; Deep Panuke discovery announced
2000	➢ Decommissioning and abandonment of the Cohasset-Panuke project

Source: Compiled from various sources by Gardner Pinfold Consulting Economists Limited.

These highlights show that the significant discoveries have so far resulted in two offshore development projects, with a third in the planning stage.

- **Cohasset-Panuke Project** – a relatively small oil project, this was the first offshore development on Canada's East Coast. The project comprised the Cohasset and Panuke fields, which were discovered in 1973 and 1986, respectively. Production began in 1992 and ended in 1999, with the field producing about 7.15 million cubic meters (45 million barrels) of light oil.

- **Sable Offshore Energy Project (SOEP)** – a natural gas development consisting of six fields, it is Nova Scotia's first major offshore project. SOEP incorporates six of the 22 Significant Discoveries, with a total of about 74 (revised down from 90.6) million cubic meters of gas, or 2.6 (revised down from 3.5) trillion cubic feet of gas. Production began in late 1999.

- **Deep Panuke** - located some 65 km to the southwest of Sable Island, is in the planning stage. Only the exploration and delineation wells drilled during 1998, 1999 and 2000 fall within the time frame of this study. However, for completeness, we note that the Development Plan Application was filed on March 1, 2002. The field is estimated to hold about 28.3 million cubic meters (one trillion cubic feet) of natural gas and will produce at an initial average daily rate of 11.3 million cubic meters (400 million cubic feet). The project consists of three platforms (production, wellhead and accommodation), with gas transported to shore by a pipeline running more or less parallel to the SOEP pipeline. It will hook up with the Maritimes and Northeast Pipeline at the landfall near Goldboro. With gas processed offshore, there will be no need for an onshore gas plant.

Since 1969, 175 wells have been drilled and companies have spent in excess of $4.5 billion on seismic and drilling wells as well as construction of the SOEP and Cohasset-Panuke projects[6].

Georges Bank

Another region thought to hold potential is Georges Bank but no exploration drilling has taken place on the Canadian part of the bank because of an oil and gas moratorium. Georges Bank is located in the Gulf of Maine. Approximately two-thirds of the Bank is located within the territorial waters of the United States while the other third is located within Canadian territorial waters. The Canadian portion of Georges Bank is part of the Scotian Basin. Because of its geological features, geologists believe that Georges Bank has substantial potential for gas and condensate. Current estimates are in the order of 175 million cubic meters (1.1 billion barrels) of oil and 150 million cubic meters (5.3 trillion cubic feet) of gas.

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[6] Personal Communication A. d'Entremont, Canada-Nova Scotia Offshore Petroleum Board.

Laurentian Basin

The Laurentian Basin is a 60,000 square-kilometre area in the Laurentian Channel between Nova Scotia and Newfoundland. The whole area is estimated to contain as much as 111 million cubic meters (700 million barrels) of oil and 255 million cubic meters (9 trillion cubic feet) of natural gas. Nova Scotia was recently awarded about 16% of the area in a recent boundary dispute decision.

4. The Four Main Phases of Oil and Gas Activity

The four phases of oil and gas activity are exploration development, production and decommissioning[7]. This section examines each phase in turn.

4.1 Exploration

Exploration consists of seismic surveys and exploration drilling to determine the existence of commercial petroleum reserves in licensed areas. Even when seismic surveys indicate that exploratory drilling may not be justified, companies may conduct both seismic and drilling activity to fulfil the terms of an exploration license.

Exploration work is capital-intensive and requires the use of expensive and highly mobile equipment, including seismic vessels, drilling rigs, supply/support vessels and helicopters. Typically these are owned and operated by specialist multinational companies that undertake exploration for petroleum companies on a contractual basis. Onshore activity to support the offshore is typically concentrated at one shore base, airport/heliport and administrative centre, which may be at considerable distance from the concession blocks being explored.

Activity levels during the exploration phase are highly variable. Experience shows that companies can terminate their efforts for a variety of reasons including poor exploration results, better prospects elsewhere, a global recession in exploration or an unwillingness to comply with requirements for local preference, taxation and/or environmental protection.

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[7] For any given oil or gas field, the phases – exploration, development production and decommissioning- follow in sequence for any field that comes into production. Normally, exploration activities will continue to occur in any area where fields are under development, and it is possible for a producing area to have all four phases underway simultaneously.

An exploration program for a particular license is often conducted over a short period and consists of specialized work. For example:

- Typically, a seismic program may last only a few weeks during the summer and use a crew of 20 to 30 individuals. However, with the advent of large 3-D seismic technology, programs may last up to several months or carry over through several field seasons.

- Drilling a single well can be completed in three or four months using a single-shift rig crew of approximately 45 (there are usually two crews, one on duty and one off duty, at any given time) and two or three support vessels crewed by approximately 12 people each. Field office support and helicopter support could add another 15-20 people.

When offshore activity first begins in an area, the short duration and the specialized nature of the work can present a challenge for local involvement. The high degree of uncertainty in this phase may also mean it will be difficult to justify the necessary investments of capital and time at the local level unless there are good prospects for continuing offshore activity. As a local area gains experience with the industry, such as Nova Scotia has over the past 35 years, these barriers are better understood and more readily dealt with.

Globalization is very much the way the exploration industry works today and the pressure to be globally competitive continues to increase. In addition, pooling of resources, with individual oil companies operating in a region sharing equipment and supply sources needed for exploration programs is another strong trend in the industry.

4.2 Development

This phase follows once a gas or oil field or fields have been declared commercially developable. Exploration may be carried out over a long period before a decision is made to develop a field, and there is no guarantee that such a decision will ever occur. Note that the first development project in Nova Scotia took place in the early 1990s, almost 30 years after the first promising discoveries of oil and gas.

A development project consists of the design, construction and installation of production equipment, including systems to bring the oil and/or gas onshore.

Off Nova Scotia, production equipment has consisted of steel platforms, containing drilling, extraction and processing facilities and associated accommodations, resting on the seabed. This is

because small fields or those located in relatively shallow water tend to use smaller production rigs, such as the jack-up for gas production off Nova Scotia or tanker transport for oil production requiring very little on-board rig storage capacity. However, for a field that is located in deep waters or a harsh marine environment, the technology used may be large concrete structures, such as the Hibernia platform, or semi-submersible (floating) platforms.

Recent technological advances are leading to an increasing use of FPSOs (floating production, storage and off-loading system) and other floating production systems. There is also a trend towards an increased use of tankers rather than pipelines to transport oil ashore, except in those areas which already have surplus pipeline capacity in place. Gas is still normally moved by pipeline, although there is increasing interest in liquefied natural gas that is shipped by tankers.

In addition to the shift to the use of floating production systems, sub-sea completions, resource pooling (several companies making use of the same resources such as a supply base) and the shift to processing sour gas offshore are technological changes that continue to rapidly change the nature of the industry. Great advances have been made in the use of downhole and underwater separation of oil and gas from associated condensates and liquids. Use of this technology means that topside structures on platforms (frequently the source of considerable local employment for finishing and installation) are not required for separation and stabilization of oil for export.

The general implication of these trends, on the one hand, is that they may reduce the potential for local employment and local production of goods and services for the offshore industry. On the other hand, the introduction of these technologies tends to lower the cost of development in harsh and challenging environments, such as the Scotian Shelf. They therefore help to make the development of Nova Scotia's resources more cost-effective and increase the likelihood they will proceed. While short-run barriers to local participation do exist, the longer the period over which offshore oil and gas activities take place, the greater the experience and capabilities that local industry can accumulate. Other things equal, this should help to place them in a better position to undertake offshore-related work.

4.3 Production

The production phase for a large field can last for several decades, although for projects involving small fields it could be much shorter (less than ten years), as was the case for the Cohasset-Panuke project in Nova Scotia. Production over a long time is potentially the most beneficial phase of activity, both because of the opportunities for employment and consumption of locally

produced goods and services and the royalties earned from the oil and gas production. The long run commitment to ongoing activity in the local area, with its significant fixed investment, can be important from a local impact point of view. It increases the likelihood of hiring locally, and that the industry will wish to use local sources for supplies and services. The long run outlook also means that it becomes more attractive for both workers and businesses in the local economy to invest time and money in seeking these longer-term economic opportunities.

4.4 Decommissioning

Decommissioning refers to the process of dismantling and removing structures and equipment rendered obsolete when the producing gas or oil field has exhausted its commercially productive reserves. Typically new offshore structures are designed to minimize the scale of wind-down activity and any associated positive or negative effects.

The Cohasset oil field off Nova Scotia was decommissioned in 2000 after operating for about seven years, and thus far, is the only development decommissioned on the East Coast. This work was done under budget and in less time than planned, and consequently had limited economic impact.

5. Nova Scotia Content

Like any project undertaken in Nova Scotia, an offshore oil or gas project may use inputs including labour supplied from Nova Scotia, supplied from other parts of Canada or supplied from foreign countries. For offshore projects, the project proponents must provide the Canada-Nova Scotia Offshore Petroleum Board with an annual report of the Canada and Nova Scotia benefits generated by the project. These are usually defined to mean the expenditure on goods and services provided to the project by Canadian-based and Nova Scotia-based companies, respectively. In addition, the benefits reports usually indicate the distribution of direct employment (measured in person years or person hours) among Nova Scotians, other Canadians and foreign nationals[8].

The concept of and measurement of benefits is critical to evaluating the economic impacts of offshore-related activities. The Benefits Reports provide the total spending and Nova Scotia spending figures from which the economic impact can be estimated. The data made available publicly in Benefits Plans and Benefits Reports are provided to satisfy regulatory requirements and not to enable the conduct of economic analysis. Overcoming the inherent data deficiencies proved to be one of the major challenges for this study.

Table 5-1 shows the Nova Scotia content of expenditure and employment for Cohasset-Panuke and SOEP, the two projects that reached the production stage during the 1990s. For the Cohasset-Panuke project, Nova Scotia content for the total development expenditure of $673 million was 37% or about $232 million. On the operating side, Nova Scotia expenditure content was slightly higher at 39%. The Nova Scotia employment content was reported at 78%, or 3,727 person years out of a total of 4,776 person years for the project. This figure covers employment for both the development and production phases. The pattern is similar for the SOEP with higher Nova Scotia content in employment (54%) than in expenditure (33%). The SOEP reports combine

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[8] Determining Nova Scotia or Canadian content is by no means straightforward. For expenditures its involves careful examination of accounting records to identify goods and services that are directly imported to the province as well as the import content of goods or service supplied by a Nova Scotia-based company. For employment, Nova Scotia content refers to work performed by a Nova Scotia resident anywhere (although only for the first six months for a Nova Scotian working outside Canada). See Consulting and Audit Canada, Presentation on Industrial Benefits on Behalf of the Canada-Nova Scotia Offshore Petroleum Board (undated, circa 1997).

development and operations information but the figures reported are mainly the results of the development phase since only the first year of operations; i.e., 2000, falls within our study period.

Table 5-1
Cohasset-Panuke Project and Sable Offshore Energy Project
Nova Scotia Content, Expenditure and Employment
(Cumulative to December 31, 2000)

	Nova Scotia	Other Canadian	Foreign	Total
Cohasset-Panuke				
Development Expenditure				
($million)	231.8	123.2	272.3	627.3
%	37%	20%	43%	100%
Operating Costs ($million)	300.9	114.7	360.1	775.7
%	39%	15%	46%	100%
Direct Employment (person years)	3,727	598	451	4,776
%	78%	13%	9%	100%
Sable Offshore Energy Project				
Development Expenditure ($million)	795.2	385.1	1,234.7	2,415.0
%	33%	16%	51%	100%
Direct Employment (person years)*	4,130	865	2,675	7,670
%	54%	11%	35%	100%

Source: *Cohasset Project – 2000 Canada/Nova Scotia Benefits Report*; Sable Offshore Energy Incorporated, *2000 Annual Report, Canada – Nova Scotia Benefits.*

Note: Year 2000 operations expenditure and employment data are combined with the development phase data in the 2000 Canada-Nova Scotia Benefits Annual Report. The 33% figure indicates the overall Nova Scotia content for both the development phase and the first year of production.

6. Economic Context

Gross Domestic Product

The economic impacts generated by offshore activities are registered in the Nova Scotia economy as and when they occur. To put them in context, it is useful to take note of the size of that economy as a whole. Gross Domestic Product[9] (GDP) provides a good measure of the size of an economy. Table 6-1 presents Nova Scotia GDP for the province as a whole, and by goods-producing industries and service-producing industries. Over the fours years, 1997-2000, GDP grew from about $18.4 billion to over $20.3 billion, expressed in basic prices at 1997 constant dollars[10]. These appear to be the most relevant years to consider since they cover the construction phase and the first year of production for SOEP, the construction of the natural gas transmission pipeline and laterals, and some exploration drilling, the most intense period of offshore activity over the study decade.

Table 6-1
Nova Scotia Gross Domestic Product at
Basic Prices 1997 Constant Dollars
($million)

	1997	1998	1999	2000
Goods Producing Industries	4,179	4,320	4,746	4,768
Service Producing Industries	14,204	14,576	15,174	15,566
All Industries	18,383	18,896	19,919	20,334

Source: Statistics Canada, *Provincial GDP by Industry*, Catalog 15-203-XIB
Note: The distinction between GDP at basic prices and GDP at factor cost is discussed in Appendix 3.

[9] GDP is the market value of the final goods and services produced by labour and property located in the Nova Scotia. As long as the labour and property are located in the Nova Scotia, the suppliers (that is, the workers and, for property, the owners) may be either Nova Scotia residents or residents of the rest of the world.

[10] For an explanation of basic prices see Appendix 3.

Investment

GDP is also measured in terms of demand for the goods and services produced in the economy. One important aspect of that demand is capital expenditure or investment spending. The investment spending that takes place in any given year measures the amount by which the economy is expanding its produced capital stock and thereby increasing its ability to produce income for its citizens in future years. In terms of economic expenditure categories, Statistics Canada records spending on offshore oil and gas facilities (platforms, offshore and onshore pipelines, the gas plant, the fractionation plant and so on) as capital expenditure. Specifically, within total capital spending, the mining category, which includes oil and gas extraction, captures most oil and gas activities. The other main category in which oil and gas-related activities fall is transportation and warehousing.

From 1997 to 2000, investment in oil and gas activities as a percentage of GDP ranged from less than one percent (a little over $100 million) in 1997 to 4.7% (over $ 1 billion) in 1998. It increased to 5.8% (almost $1.3 billion) in 1999 and dropped back to about 3% (about $700 million) in 2000. Evidently, in the later 1990s, oil and gas investment provided an important stimulus to the Nova Scotia economy.

To broaden the perspective somewhat, Figure 6-1 illustrates the importance of offshore activities in overall capital spending over the study period. (See Appendix 1 for the detailed data underlying Figure 6-1.) The variability in oil and gas capital spending accounts for much of the variability in total capital spending in Nova Scotia over the study period. The Cohasset-Panuke project shows a small increase in capital spending during 1991-1992. The bulge in capital spending caused by the SOEP (1998-1999) accounts for much of the variation in total capital spending during these years. Transportation and warehousing investment (dotted line) exhibits the same pattern as oil and gas capital spending[11].

Moreover, it is apparent that oil and gas spending has largely driven capital spending in the mining sector. Oil and gas accounted for over 70% of mining sector investment during the Cohasset-Panuke development, and this jumped to over 90% during the SOEP development phase (Figure 6-2).

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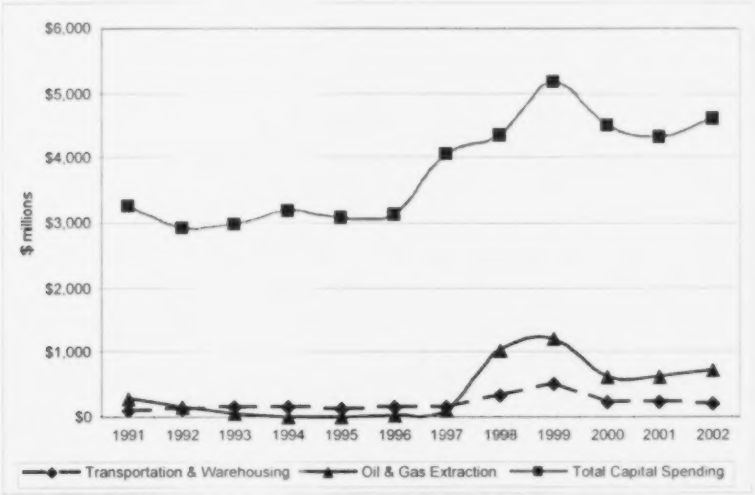
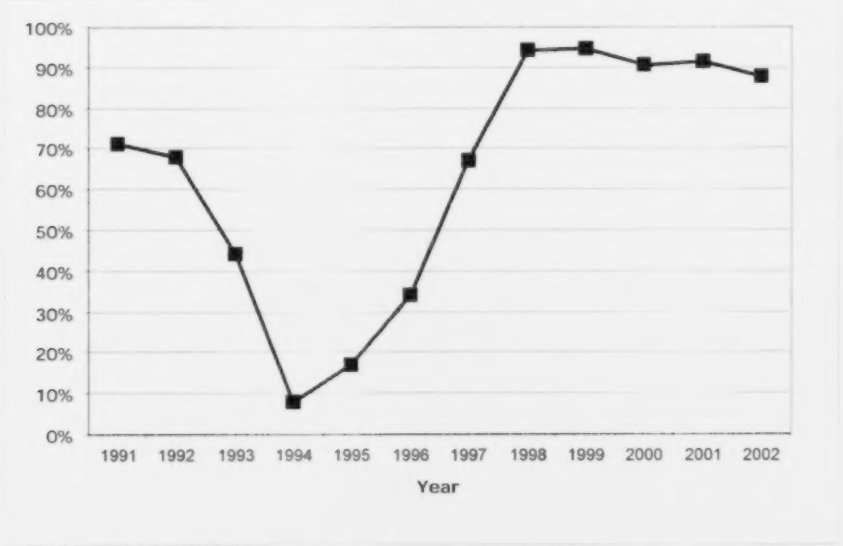
[11] Transportation and warehousing spending averaged about $145 million over 1991 to 1997. During the peak years of SOEP and pipeline development, spending in this area exceeded the previous average by as much as $360 million in 1999.

Figure 6-1
Capital Expenditure, Nova Scotia
Total Capital Spending, Oil and Gas Spending, Transportation and Warehousing



Source: Statistics Canada, CANSIM database / Prepared by Gardner Pinfold Consulting Economists Limited
Note: The time series is extended to 2002 solely to show the drop off investment spending after the peak in SOEP construction activity.

Figure 6-2
Oil and Gas Capital Spending as Percentage of Total Mining Capital Spending, Nova Scotia
1991 - 2002



Source: Statistics Canada, CANSIM database
Prepared by Gardner Pinfold Consulting Economists Limited

Employment

Another useful contextual comparison is to examine the amount of employment created by offshore-related activities relative to the total provincial employment. Until the SOEP started into its development phase, offshore-related employment in Nova Scotia was very small. Most of it was generated by the production phase for Cohasset-Panuke. Even with the SOEP development, the contribution of the offshore and related activities to total employment appears to be modest.

The true contribution of offshore-related employment to the economy can be appreciated by examining employment over the three years 1998-2000 when SOEP related activities were at their peak (Table 6-2). In 1998, total offshore-related employment was about 4,200 people, or about 1.1% of total employment[12]. In 1999, offshore-related employment increased to about 11,100 persons or about 2.7% of total employment. In that year, offshore activities effectively accounted for all of the net gain in employment. By 2000, offshore-related employment had dropped back to about 6,700 person or about 1.6% of the economy's employment in that year.

Table 6-2
Offshore-related Employment and Total Employment Growth
Nova Scotia, 1998-2000
('000 persons)

	1998	1999	2000
Total Employment	398.9	408.6	419.5
Offshore-related Employment	4.2	11.1	6.7
Offshore-related as % of Total	1.1	2.7	1.6

Source: Nova Scotia Department of Finance, Statistics Division, Employment by Industry, 1992-2001
Prepared by Gardner Pinfold Consulting Economists Limited

[12] The offshore-related employment figures reported here are derived from the total employment impacts reported in Chapter 7.

7. Economic Impacts

This section presents an analysis of the economic impacts of the offshore projects as well as additional seismic and drilling work not included in the Cohasset-Panuke and SOEP. The analysis estimates direct and spinoff impacts, where adequate expenditure data are available for such analysis. Impacts are presented on an expected (*ex-ante)* basis and an actual (*ex-post)* basis to allow comparison of what was expected with the study's estimate of what happened. The study's estimate of what happened applies data and other information from benefits reports and other sources to the Nova Scotia Input-Output Model[13].

The impacts estimated by the Nova Scotia Input-Output Model are gross impacts[14]. The study examined issues that would lead to a difference between gross and net impacts. This will be identified wherever offshore project activity may have had a displacement effect on other economic activity in the province. The study has concluded that the gross impacts are a reasonable estimate of net impacts, especially given the excess capacity in the Nova Scotia economy at the time. (See Appendix 8 for the discussion.) The impacts should be viewed in relation to the size of the Nova Scotia economy and also in terms of conventional economic variables such as Gross Domestic Product, household income, and employment.

7.1 Summary Analysis

The economic impacts of offshore activities during 1990–2000 were analyzed in terms of their contribution to GDP and employment. Section 7.1 provides some comparative analysis to help put the impacts in perspective. First, the expected impacts are compared with the actual impacts on an activity-by-activity basis. Second, the impacts are examined to show which sectors of the economy experienced the greatest impacts. Finally, the impacts are distributed across the study period to given an indication of the impacts on a year-to-year basis. Section 7.2 outlines the detailed analysis of offshore activities.

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[13] See Appendix 2 for a description of input-output models in general and the Nova Scotia models in particular.

[14] Note that the definition of Nova Scotia content used by the Canada-Nova Scotia Offshore Petroleum Board, referred to in footnote 8, differs from the way in which Nova Scotia content is handled by the Nova Scotia Input-Output Model. In applying the input-output model analysis care was taken to adjust the expenditure data used to create the relevant direct requirements vectors so that the model's treatment of total expenditure and Nova Scotia content is consistent with the Board's definition. Failing to make these adjustments would lead to double counting of imported goods and services, and consequently a low estimate of Nova Scotia economic impacts.

Impacts: Expected and Actual[15]

A point of interest is how close do the estimated economic impacts of a project based on information from the planning and review stage match the actual impacts realized when the project is implemented. Table 7-1 shows that for the Nova Scotia offshore activities or related activities during 1990-2000, where both expected and actual impact estimates are available, the actual impacts exceed the expected impacts in all cases except the M&NP laterals. For example, for the SOEP, expected spending was estimated at $1.6 billion of which $547 million would be placed in Nova Scotia. The total ex-ante GDP impact was estimated at $590 million with associated employment impact of 11,100 person years. Actual development spending is reported at almost $2.3 billion[16] ...on occurred in Nova Scotia. It is not surprising, therefore, that the actu... ...llion) and employment impact (14,460 person years) exceed the expect... ...lt occurs for Cohasset-Panuke and the M&NP main pipeline. The excep... ...aterals where actual GDP ($67 million) exceeds expected GDP ($52 million), while actual employment (820 person years) is less than expected employment (985 person years)[17]. There were no ex-ante impact estimates for the exploration activities. The ex-post exploration impacts are included for ease of comparison with the other activities.

[15] Expected refers to ex-ante impact estimates made using planned expenditures for a project or activity before the project has been implemented. Actual refers to ex-post estimates of economic impact based on actual expenditures reported for a project or activity.

[16] In the SOEP SEIS, it appears, although the wording is imprecise, that the $1.6 billion expenditure was meant to cover what are now called Tier 1 and Tier 2; that is, the complete project. Now, ExxonMobil estimates that Tier 2 alone will be a $1 billion investment, bringing the total SOEP investment cost to about $3.2 billion, or double the original estimate.

[17] This is largely explained by the use of a higher wage rate per person year and allowance for extensive overtime in the actual analysis (based on direct project knowledge) rather than the industry-wide average wage used in the expected analysis.

Table 7-1
Economic Impacts for Nova Scotia Offshore related Projects
Expected and Actual, 1990 – 2000

	Cohasset-Panuke		SOEP		M&NP Main Pipeline[4]		M&NP Halifax, Point Tupper Laterals		Exploration	
	Expected	Actual	Expected	Actual	Expected[3]	Actual	Expected	Actual	Expected[4]	Actual
Development										
Expenditure [1] ($ million)										
-Total	160	498	1,600	2,282	544	743	75	93	na	280
-Nova Scotia	60	184	547	712	na	183	42	53	na	93
GDP ($million)	34	212	590	773	98	231	52	67	na	81
Employment (person years)	1,280	3,080	11,100	14,460	810	2,770	985	820	na	1,300
Operations										
Expenditure ($ million)										
-Total	71	110	64	133	na	na	na	na	na	na
-Nova Scotia	23	43	47	67	na	na	na	na	na	na
GDP ($million) [2]	14	50	50	81	na	na	na	na	na	na
Employment (person years)	340	700	1,030	1,670	na	na	na	na	na	na

Source: Gardner Pinfold ConsultingEconomists Limited

Notes

1. The expenditures and impacts of the projects were reported sometimes in constant dollars and sometimes in current dollars. This distinction is ignored here because the 1990s was a decade of relatively low inflation (applies to Cohasset-Panuke) or the Expected and Actual impacts are close in time (SOEP, pipelines).

2. This comparison excludes the direct impact of the net sales of oil, natural gas and natural gas liquids since these were not part of the original Expected estimates.

3. The Expenditure figure covers the complete pipeline. No expected impacts are given for Nova Scotia. The Expected GDP and employment impacts only cover direct and indirect impacts unlike the Actual impacts which include direct, indirect and induced.

4. Reported for completeness; there were no Expected estimates made.

5. Expected pipeline employment impacts that were reported in terms of jobs have been converted to person years at the rate of 1.35 jobs per person year.

na - not available or not calculated.

Economic Impacts by Sector

The aggregate economic impacts reported for offshore oil and gas activities can be disaggregated by sector of the economy affected as shown in Table 7-2. For example, for the SOEP development phase total contribution to GDP was $773 million, of which almost $279 million was direct GDP from the project itself. The remaining $494 million of GDP contribution came from other sectors of the Nova Scotia economy as a result of spinoff economic activity.

Table 7-2
Nova Scotia Offshore Oil and Gas Activities
Economic Impacts by Sector
1990 – 2000

Offshore Impacts: GDP Impacts by Sector

Sector	SOEP Development	CoPan Development	SOEP Operations	CoPan Operations	Exploration	M&NPP Mainline	M&NP Laterals
			($ million)				
Primary Resources	33.8	9.8	2.4	3.3	13.9	11.8	2.9
Manufacturing	60.0	14.9	2.3	3.3	2.5	5.7	1.7
Construction	70.7	2.2	0.4	0.3	0.4	1.0	0.3
Transportation, Storage & Communication	100.6	50.2	11.1	8.3	9.3	12.3	3.6
Wholesale & Retail	57.5	15.1	8.1	3.6	6.1	16.7	4.6
Finance, Insurance & Real Estate	97.8	25.9	9.4	5.8	9.0	26.9	7.9
Services	73.9	19.0	18.2	6.5	6.6	37.5	11.8
Direct GDP	278.9	75.0	806.8	84.2	32.3	118.9	34.4
Total	773.2	211.8	858.8	115.2	80.0	230.7	67.2

Offshore Impacts: Distribution of Sector GDP Impacts

Sector	SOEP Development	CoPan Development	SOEP Operations	CoPan Operations	Exploration	M&NPP Mainline	M&NP Laterals
			(Percent)				
Primary Resources	4.4	4.6	0.3	2.8	17.3	5.1	4.3
Manufacturing	7.8	7.0	0.3	2.8	3.1	2.5	2.5
Construction	9.2	1.0	0.1	0.2	0.5	0.4	0.4
Transportation, Storage & Communication	13.0	23.7	1.3	7.2	11.6	5.3	5.3
Wholesale & Retail	7.4	7.1	0.9	3.1	7.6	7.2	6.9
Finance, Insurance & Real Estate	12.6	12.2	1.1	5.0	11.3	11.6	11.7
Services	9.6	9.0	2.1	5.6	8.3	16.2	17.6
Direct GDP	36.1	35.4	93.9	73.1	40.3	51.5	51.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

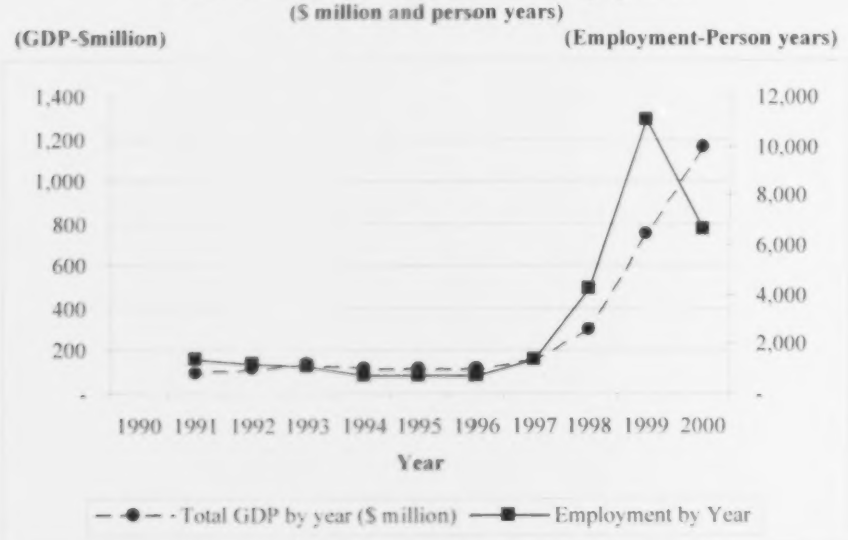
Source: Gardner Pinfold Consulting Economists Limited

Impacts Over Time

Over the study period 1990-2000, offshore oil and gas activities in Nova Scotia consisted of a set of independent activities. These included the Cohasset-Panuke oil project, the SOEP and the construction of the main natural gas transmission pipeline and laterals to convey the SOEP gas to market, and some additional exploration drilling. The economic impacts of each of these activities were analyzed separately and reported in Table 7-1. To spread the impacts over time, the study assumed that GDP and employment in a given year would be determined by the project spending in that year. For each of the offshore-related projects, the study determined the rate of spending by year and then aggregated by year across the projects to get total yearly spending. Total GDP and employment for the study period was then distributed on a yearly basis in proportion to yearly spending.

Figure 7-1 shows the aggregate annual contribution of these activities to provincial GDP. Up to 1997, Cohasset-Panuke was the only offshore contributor to GDP, starting with the development phase in 1991 and increasing gradually to 1993 where the combination of operations spending plus some development expenditure created an interim peak in GDP. From 1994 to 1996 GDP contribution stabilizes at close to $120 million, until the effects of SOEP begin to show in 1997. Then the GDP contribution increased quickly from the combined effects of SOEP construction, pipeline construction and exploration activity in 1998 and 1999, making the wind down of Cohasset-Panuke in 1999 hardly noticeable. The peak GDP during the study period was almost $1.2 billion in 2000. This coincided with the first full year of SOEP natural gas production when GDP contribution was dominated by the sales value of natural gas. Employment follows a similar pattern up to 1998 and topped out at over 11,000 person years in 1999 when the peak in SOEP construction coincided with construction of the M&NP main pipeline. Employment dropped back to about 7,000 person years in 2000 when SOEP production began. About one-half of this employment was generated by SOEP development work and a little over 25% by SOEP operations. The rest came from the MN&P laterals and exploration work.

Figure 7-1
Offshore Oil and Gas Projects
Contribution to Nova Scotia GDP and Employment
($ million and person years)



Source: Gardner Pinfold Consulting Economists Limited

7.2 Detailed Analysis by Activity

7.2.1 Cohasset-Panuke Oil Project

Overview

- **Facilities**

The Cohasset-Panuke project involved the development of two oil fields located approximately 35 nautical miles southwest of Sable Island. The fields were about five miles apart. The water depth in the area ranged from 38 to 44 meters. The reservoirs were located at a depth of about 2,200-2,350 meters.

A single wellhead jacket was installed at each field. The jacket at Panuke supported four wellheads and production trees, while the jacket at Cohasset supported eight weilheads and production trees. The wells were drilled with a jack-up rig, which served as the production unit at the Cohasset site. The Panuke facilities were unmanned and operated remotely from the production jack-up at Cohasset. Sub-sea flowlines and a control line were installed between the Panuke and Cohasset jackets.

Produced oil was stored in a 60,000 DWT storage tanker moored on a continuous basis during the production season. A 40,000 DWT shuttle tanker was used to transport the oil mostly to markets in the United States and Europe. Oil production started in 1992 and finished in 1999.

- **Expected Expenditures**

Total capital costs were originally estimated to be $160.0 million ($1989)[18]. Operating costs were estimated to be $53.1 million in the first year of production, then rising to and stabilizing at $71.2 million when production reached maximum level in year three. Over its productive life operating costs were expected to total about $405 million ($1989), including abandonment costs estimated at about $18.5 million.

- **Expected Employment**

The project was expected to create about 680 person-years of employment during the development phase. Annual employment onshore and offshore during production was estimated to be about 165, most of which would be filled by Nova Scotians.

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[18] As reported in: Lasmo Nova Scotia Limited, *An Analysis of Economic and Socio-economic Impacts of the Cohasset/Panuke Development*, prepared by Gardner Pinfold Consulting Economists Limited, January 1990.

Expected Economic Impacts

➢ Assumptions

The analysis of economic impacts requires assumptions about the location of site specific and non-site-specific activities. As a general principle, the 1990 impact study assumed that if industry in Nova Scotia had the capability, it would carry out the following activities:

- a portion of the preliminary studies and of engineering, management and administration
- development drilling and completions
- wellhead jacket fabrication
- a portion of production facilities fabrication
- offshore and land-based production activities

Scale of the Project

The 1990 study found that the size of the project was such that the demands placed on social and physical infrastructure would be relatively small and easily absorbed within the existing economy.

Expected Economic Impacts

The 1990 impact study used the 1984 version of the Nova Scotia Input-Output Model to estimate the economic impact of the project on the province of Nova Scotia. Both the development and production phases were examined. Impacts were expressed in terms of total income (Gross Domestic Product) and employment. The report also presented the impact on government revenue, both at the provincial and municipal level.

Project Direct Expenditures

The project had an estimated cost of $160 million. A preliminary review of project requirements suggested that as much as $60.4 million of the capital cost could be spent in Nova Scotia. Of the balance, $52.8 million was assumed to be spent in the rest of Canada and $46.8 million on imported goods and services.

Annual operating costs during full production were estimated to be $71.2 million. Of this, $23.4 million was likely to be spent in Nova Scotia, $5.0 million spent in the other provinces, and $42.8 million spent on imports.

Development Phase

➢ Direct and Indirect Impacts

Based on direct project expenditures in Nova Scotia of $60.4 million direct and indirect income (GDP) was expected to increase by approximately $24 million. This increase in income was associated with the estimated direct and indirect employment of 1,050 person years created by the project. Total provincial and municipal government revenues arising from these direct and indirect impacts were estimated at $1.3 million. The expected impacts of the project are summarized in Table 7-3.

Table 7-3
Cohasset-Panuke Development Phase
Expected Impacts

Economic Indicator	Direct & Indirect Impacts	Induced Impacts	Overall Impacts
GDP ($1989 million)	23.5	10.5	34.0
Employment (person-years)	1,050	230	1,280
Government revenues ($1989 million)			
- Provincial	0.8	3.1	3.9
- Municipal	0.5	0.7	1.2
Total	1.3	3.8	5.1

Source: Lasmo Nova Scotia Limited, *An Analysis of Economic and Socio-economic Impacts of the Cohasset/Panuke Development*, prepared by Gardner Pinfold Consulting Economists Limited. January 1990.

➢ Induced Impacts

Induced activity was expected to cause incomes to increase by an estimated $10.5 million. The number of jobs created as a result of this increased consumer spending was expected to be about 230. Total provincial and municipal government revenues were expected to increase by $3.8 million.

➢ Overall Impacts

In total, income in the province was expected to increase by about $34 million. The model predicted this would result in the creation of 1,280 jobs. Total provincial government revenues generated by the project were expected to be about $3.9 million. Municipal revenues were expected to increase by $1.2 million.

Production Phase

Annual direct project expenditures (at peak production) in Nova Scotia were expected to be $23.4 million. Table 7-4 summarizes the impacts.

➢ Direct and Indirect Impacts

Total income in Nova Scotia was expected to increase by almost $10 million annually. This increase in income would result from the 280 jobs created annually by the project. Total provincial and municipal government revenues arising from these direct and indirect impacts were estimated at $0.6 million (excluding any expected royalties[19] or taxes related to oil production).

Table 7-4
Cohasset-Panuke Production Phase
Expected Impacts
(typical year)

Economic Indicator	Direct & Indirect Impacts	Induced Impacts	Overall Impacts
GDP ($1989 million)	9.7	4.4	14.1
Employment (person-years)	280	60	340
Government revenues ($1989 million)			
- Provincial	0.4	1.3	1.7
- Municipal	0.2	0.3	0.5
Total	0.6	1.6	2.2

Source: Lasmo Nova Scotia, *An Analysis of Economic and Socio-economic Impacts of the Cohasset Panuke Development*, prepared by Gardner Pinfold Consulting Economists Limited, January 1990.
Note: Government revenues exclude any royalties or taxes related to oil production.

➢ Induced Impacts

Induced activity was expected to cause incomes to increase by an estimated $4.4 million. The number of jobs created as a result of this increased consumer spending was estimated to be about 60. Total provincial and municipal government revenues were expected to increase by $1.6 million.

[19] Neither the Cohasset-Panuke nor the SOEP ex-ante economic impact analyses assess the expected royalties. Actual royalties are discussed in Section 7.6.

- **Overall Impacts**

  In total, income in the province was expected to increase by about $14 million. The model predicts this would result in the creation of 340 jobs. Total provincial and municipal government revenues generated by the project were expected to be about $2.2 million.

Actual Expenditures

Planning for the Cohasset-Panuke project began in 1989, leading to the first development spending in 1991. Oil production started in 1992 and continued until December 1999. Development spending on well drilling and completion, platform facilities and other items continued throughout this period. Total spending by the Cohasset-Panuke project breaks down as follows:

- **Development:** $498.1 million comprised of $447 million for development and $51.1 for decommissioning. About 90% of the decommissioning spending occurred in 2000.
- **Production:** average annual expenditure at about $110 million over the seven-year production period.
- **Exploration and Delineation:** $180.3 million. This spending is included in the 2000 Canada-Nova Scotia Benefits report for the Cohasset-Panuke project. It covers six wells drilled during 1999 and 2000 for what is known as the Deep Panuke project. We have chosen to deal with it separately from the Cohasset-Panuke project since it relates the production of natural gas rather than oil. Deep Panuke is expected to be about a $1.1 billion investment by the project proponent EnCana. Natural gas production is expected to begin around 2005[20].

[20] See http://www.encana.com/operations_and_projects/deep_panuke.shtml for more details.

Actual Economic Impacts[21]

➢ Development Phase

Analysis of Cohasset-Panuke direct spending starts by first identifying the portion that enters the Nova Scotia economy and the portion that is directly imported from other parts of Canada and the rest of the world. Based on the available information, total direct employment is estimated at about 1,080 person years and an additional 2,000 person years of spinoff employment, for a total of 3,080 person years (Table 7-5). The direct impacts would have been spread across the construction period, roughly in proportion to spending. These impacts also include impacts of the decommissioning spending in 2000. The spinoff impacts occur with some lag and, because of the decommissioning expenditure, would have spread into 2000 and perhaps a little into 2001. Total GDP impact is estimated at $212 million.

Table 7-5
Cohasset-Panuke Development Impacts
Total Capital Expenditures, $498.1 Million

	Direct	Spinoff	Total
Employment (person years)	1,080	2,000	3,080
Household Income ($million)	75.0	94.3	169.3
Provincial Tax Revenue ($ million)	10.5	14.1	24.6
GDP @ factor cost ($million)[22]	75.0	136.9	211.9

Source: Gardner Pinfold Consulting Economists Limited

[21] As estimated using the 1996 Nova Scotia Input-Output Model.

[22] Normally one would expect that direct GDP would be greater than direct household income since it includes additional income items such as corporate profits (see List of Acronyms and Definitions for the complete list of items). Where information is scarce for an impact analysis, it becomes necessary to model the project spending as a set of related activities (in effect a new industry) rather than as the injection of spending into a reasonably well-defined industry already included in the model structure. When this happens, the model cannot produce separate estimates of direct household income and direct GDP. So, while the direct GDP is understated, the "missing" GDP is picked up in the spinoff GDP and total GDP is a complete measure. This is the case for the both the exploration and development expenditures analyzed in this report. As the offshore oil and gas activity becomes better defined in Nova Scotia, it should be possible to modify subsequent input-output models to rectify this situation.

➢ Operations Phase

Annual operations spending was about $110 million. Analysis of this direct spending indicates that 39% of the total spending or about $42.9 million was spent on materials, services and labour in Nova Scotia. The remaining 61% was imported directly from other parts of Canada and the rest of the world. The estimated annual direct employment generated was about 240 person years (Table 7-6). This was associated with household income of about $18.5 million. Taking into account the inter-industry purchases and the spending of income earned, spinoff employment added another 460 person years of employment and about $21.5 million of household income. Direct GDP is estimated at about $84.2 million (annual average) after including the net value of the oil sales, calculated as gross sales less operating costs. Spinoff GDP impacts are about $31.0 million, for a total GDP impact of about $115.2 million. The net value of oil sales portion of direct GDP leaks immediately from the provincial economy and hence generates no spinoff impacts. The technical reasons for this are explained as part of the analysis of the actual impacts of the SOEP production phase in the next section.

Table 7-6
Cohasset-Panuke Annual Operating Expenditures Impacts
Average Annual Expenditures, $110 Million

	Direct	Spinoff	Total
Employment (person years)	240	460	700
Household Income ($million)	18.5	21.5	40.0
Provincial Tax Revenue ($million)	2.6	3.2	5.8
GDP @ factor cost ($million)	84.2	31.0	115.2

Source: Gardner Pinfold Consulting Economists Limited
Note: Provincial Tax Revenue does not include revenues in Table 7-20.

7.3 Sable Offshore Energy Project (SOEP)

Early studies predicted that the area around Sable Island would be rich in petroleum. The first exploration wells were drilled in the late 1960s, revealing natural gas and liquids in sandstone reservoirs. Recoverable gas was discovered between 1973 and 1986 in porous sandstone reservoirs 4,000-6,000 meters below the sea bottom including the Thebaud, Venture, North Triumph, South Venture, Alma, and Glenelg fields.

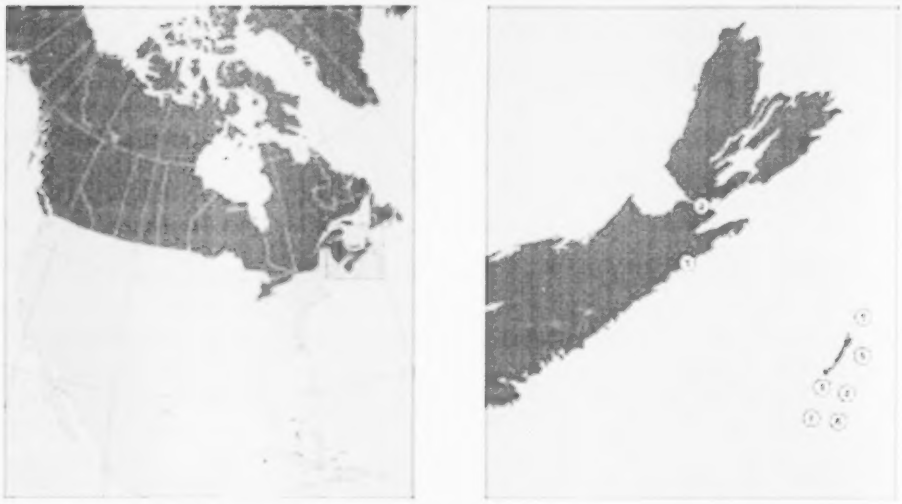
A consortium that included originally Mobil Oil Canada Properties, Shell Canada Limited, PetroCanada, Imperial Oil Resources Limited and Nova Scotia Resources Limited (NSRL), developed a plan for the production, transmission, and processing of the natural gas and liquids. ExxonMobil Canada has now replaced Mobil as the lead partner and operator for the SOEP. In addition, the NSRL share has been purchased partly by Emera, an integrated energy company

located in Nova Scotia, and the other partners. PetroCanada is no longer a partner. Production plans, which are reviewed regularly, call for the production of more than 74 billion cubic meters (2.6 trillion cubic feet) of gas, which would provide gas to parts of the Maritime Provinces and eastern United States until the year 2025.

The SOEP project fields are located on the Scotian Shelf, approximately 200 km off the coast of Nova Scotia (Figure 7-2). Development of the Venture, North Triumph and Thebaud fields got under way in the mid-1990s, and production began on December 31, 1999. Development of three more fields - Alma, Glenelg and South Venture - is scheduled for 2003 to 2007.

Gas is currently collected from offshore production platforms and sent to the facilities onshore by a sub-sea pipeline to the gas plant at Goldboro, in Guysborough County. The natural gas liquids are separated from the gas and then transported by an onshore pipeline from Goldboro for further processing and shipping at the liquids processing facility in Point Tupper (Cape Breton). Passing through Nova Scotia and New Brunswick, the Maritimes & Northeast Pipeline transports the natural gas to US and Canadian markets. This pipeline enters Maine and ties into the North American Gas Grid. Laterals also deliver gas to the Halifax and Port Hawkesbury areas, currently only for industrial clients until a residential distribution system is developed. SOEP began producing gas in late 1999 and delivering gas to these markets in early 2000.

Figure 7-2



Source: http://www.soep.com/cgi-bin/getpage?pageid=1/3/0

1	Goldboro Gas Plant	5	Venture
2	Point Tupper Fractionation Plant	6	South Venture (Tier 2)
3	Thebaud Central Processing Facility	7	Alma (Tier 2)
4	North Triumph	8	Glenelg (Tier 2)

A Two-Tier Development

The SOEP is being developed in two tiers. Tier 1 involved the drilling and the construction of production facilities at Thebaud, Venture and North Triumph. These fields were developed to maintain a sales gas rate of 13.0 million cubic meters (460 million cubic feet) per day. Tier 2 drilling and construction at the South Venture, Glenelg and Alma fields was originally planned for 2003-2007. The Alma field is under development now. The Sable project facilities are being designed so that with proper inspection, maintenance and repairs, they can be used beyond the 25-year project life. Exploration work has been underway and will continue in the future to expand the commercially producible reserves. The project is currently producing gas at a rate of about 15.6 million cubic meters (550 million cubic feet) of gas per day and about 3,180 cubic meters (20,000 barrels) per day of natural gas liquids.

SOEP Development Phase

The main elements of the SOEP development include:

- Engineering – the cost of engineering design and services for all the project components;
- Drilling – the cost of drilling and completing wells;
- Platforms – the cost of fabricating, installing and hooking up those facilities which extract raw gas;
- Pipelines – the fabricating, trenching and laying the sub-sea pipelines from the individual platforms to a common point (at the Thebaud platform) and then on to landfall near Goldboro, plus the cost of the liquids pipeline from the gas plant to Point Tupper;
- Gas plant and related facilities – the cost of designing, constructing, equipping and commissioning the onshore facilities involved in receiving the raw natural gas, separating the natural gas liquids (NGL) and dehydrating the gas for transmission; and
- NGL facilities – the cost of designing, constructing, equipping and commissioning the natural gas liquids processing facilities at Point Tupper.

The economic impact analysis conducted as part of the Socio-Economic Impact Statement (SEIS)[23] for the SOEP started with a value of $2.0 billion as the expected total cost of the project (based on a 50% probability estimate). The range of possible costs was given as $1.8 to $2.5 billion, all values expressed in 1995 constant dollars. Included in the $2.0 billion was an allocation of $400 million for project overheads, insurance, remote location allowance, staff relocation, financing costs and exchange rate exposure. This allocation was actually excluded from the economic impact analysis, which used a total direct development spending figure of $1.6 billion and associated global direct employment of 5,570 person years.

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[23] Sable Offshore Energy Project, Socio-Economic Impact Statement, Volume 4 of the five-volume application for approval, February 1996.

SOEP Production Phase

The production phase involves the collection and transportation of the raw gas for processing into natural gas and natural gas liquids. It is expected to run for 25 years.

Production phase costs can be broken down into five parts:

- Platform costs — for platform operations and maintenance (including offshore support and services);
- Pipeline/marine costs — for surveillance, inspection and maintenance;
- Gas plant/NGL facilities — for operation and maintenance of the gas and NGLs processing and shipping facilities;
- Shore base/office costs — for the operation of the office, warehouse and administrative functions; and
- Well servicing costs — for maintaining the wells to ensure optimal gas flow.

The estimated average annual production phase expenditures (50% probability) were $80 million ($1995 million) which included $16 million to cover insurance, project overhead costs and exchange rate exposure. For SEIS purposes, the average annual expenditure was set at $64 million, $44 million for materials and $20 million for labour. The associated employment was estimated at 156 person years full-time and 84 person years part-time.

Nova Scotia Content

Overall Nova Scotia content in the $1.6 billion development phase spending was estimated at 34% ($547 million), split between materials (28% or $341 million) and labour (53% or $206 million). This was expected to occur in five general areas:

- Marine transportation services (standby vessels, support vessels);
- Construction (gas plant, NGL facilities, related facilities);
- Business services (catering, equipment rentals, warehousing, environmental services, diving);
- Air transportation services (helicopter services); and
- Wholesale trade (distributors, agents, supply houses).

For the production phase, Nova Scotia content was estimated at 73% or $47 million of the estimated total average annual spending of $64 million. Of this amount, materials would account

for $28 million (64% of total materials spending) and labour for $19 million (96% of total labour spending).

Expected Economic Impacts

➢ Development Phase

The SOEP SEIS estimated the economic impacts for Nova Scotia using the 1984 Nova Scotia Input-Output model. Direct household income was estimated at $206 million and spinoff income at $354 million (Table 7-7). The associated direct and spinoff employment was estimated to be 2,920 person years and 8,180 person years. The total GDP impact (measured at market prices) was estimated to be $590 million, consisting of $220 million direct GDP and $370 million spinoff GDP. Although reported as a single value, the direct impact would be spread across the years in which the SOEP facilities were constructed. Spinoff impact would also be spread with a lag allowing for the re-circulation of spending through the economy, such that it would endure in diminishing amounts for several years beyond the end of construction.

Table 7-7
SOEP Development Phase Expected Economic Impacts
Based on $1.6 Billion Total Expenditure

	Direct	Spinoff	Total
Employment (person years)	2,920*	8,180	11,100
Household Income ($1995 million)	206	354	560
GDP ($1995 million) #	220	370	590

Source: Sable Offshore Energy Project, Socio-Economic Impact Statement, 1996, Table 8.4-27.
Notes: *Also reported as 3,940 jobs, assuming 1.35 jobs per person year of work.
The SOEP SEIS (Table 8.4-27) combines the direct and indirect GDP estimate into a single value. We have apportioned the total GDP estimate according to the ratios of direct and spinoff household income to total household income for reporting purposes.

➢ Production Phase

The total direct annual spending of $80 million during the production phase was estimated to generate direct household income of $19 million and spinoff GDP of $28 million (Table 7-8). GDP impacts were slightly greater. This was associated with direct employment of about 230 person years and spinoff employment of 800 person yeas.

Table 7-8
SOEP Production Phase, Expected Annual Economic Impacts,
Based on $64 million Annual Expenditure

	Direct	Spinoff	Total
Employment (person years)	230*	800	1,030
Household Income ($1995 million)	19	28	47
GDP ($1995 million) #	20	30	50

Source: Sable Offshore Energy Project, Socio-Economic Impact Statement, 1996, Table 8.5-17.
Notes: *Also reported as 264 jobs, assuming 1.35 jobs per person year of work.
The SOEP SEIS (Table 8.5-17) combines the direct and indirect GDP estimate into a single value. We have apportioned the total GDP estimate according to the ratios of direct and spinoff household income to total household income for reporting purposes.

Actual Economic Impacts[24]

➢ Development Phase

To the end of 2000, total Tier 1 SOEP expenditure was reported at $2.4 billion. This figure includes development spending that started in 1997 as well as the first full year of operating expenditure in 2000. For analytical purposes, we have allocated about $2.3 billion to actual development spending and about $133 million to operating expenditure.

Analysis of the impacts of this direct spending starts by first identifying the portion that enters the Nova Scotia economy and the portion that is directly imported from other parts of Canada and the rest of the world. The Nova Scotia content of the direct development spending up to the end of 2000 was about 31%, or $712 million out of $2.3 billion. By the end of 2000, the Nova Scotia percentage of total spending had risen to about 33% reflecting the inclusion of operating expenditure, with its higher Nova Scotia content, in the overall spending figures[25].

Based on the available information, for the development phase total direct employment is estimated at about 3,440 person years and an additional 11,020 person years of spinoff employment, for a total of 14,460 person years (Table 7-9). The direct impacts would have been spread across the construction period (1997-2000), roughly in proportion to spending. The spinoff impacts occur with some lag and thus would have spilled over into 2001. Associated with these jobs, direct household income is estimated at about $280 million. Spinoff income adds almost another $350 million for a total household income impact of close to $630 million. Allowing for the inclusion of non-labour income (corporate profits, interest, etc) leads to an estimated level of spinoff GDP of about $494 million and total GDP of about $773 million.

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[24] As estimated using the 1996 Nova Scotia Input-Output Model.

[25] See Sable Offshore Energy Incorporated, *2000 Annual Report, Canada – Nova Scotia Benefits.*

Table 7-9
SOEP Development Impacts
Total Capital Expenditures, $2.282 Billion

	Direct	Spinoff	Total
Employment (person years)	3,440	11,020	14,460
Household Income ($million)	278.7	348.5	627.3
Provincial Tax Revenue ($ million)	38.4	52.6	91.0
GDP @ factor cost ($million)	278.7	494.3	773.0

Source: Gardner Pinfold Consulting Economists Limited

Operations

Based on the available information, we estimate that operations spending was about $133 million in 2000, of which about 50% was spent on materials, services and labour in Nova Scotia. The other 50% was imported directly from other parts of Canada and the rest of the world.

The estimated annual direct employment generated was about 310 person years (Table 7-10). This was associated with household income of about $28.8 million. Adding in the impacts of the inter-industry purchases and the spending of incomes earned, spinoff employment added another 1,360 person years of employment and about $34.5 million of household income. Direct GDP is estimated at almost $807 million, when the net revenue on the sales of natural gas and natural gas liquids is factored in[26]. Including non-labour income, the spinoff GDP impacts are about $52 million, noting once again that this analysis assumes that the net revenue passes directly out of the Nova Scotia economy. The total annual GDP impact is about $859 million.

[26] Note that this is net revenue after deducting the total operating costs from sales revenue from gas and gas liquids for the year 2000. Return of capital (depreciation), return to capital, royalties, corporate taxes and so on must all be paid from this. Here we are only concerned with the total amount since, other than royalties and other taxes which are estimated later, we are assuming that the net revenue does not have any additional impact on the Nova Scotia economy. In other words, in this analysis it is assumed that the net revenue is not re-invested in the provincial economy. It would be possible, however, to interpret the spending on exploration drilling for the SOEP Tier 2 wells as reinvestment. The impact of this spending is analyzed separately below.

Table 7-10
SOEP Annual Operating Expenditures Impacts
Average Annual Expenditures, $133 Million

	Direct	Spinoff	Total
Employment (person years)	310	1,360	1,670
Household Income ($million)	28.8	34.5	63.3
Provincial Tax Revenue ($million)	4.0	5.2	9.2
GDP @ factor cost ($million)	806.8	52.0	858.8

Source: Gardner Pinfold Consulting Economists Limited
Notes: We have included the contribution to GDP in Nova Scotia resulting from the value of the natural gas and natural gas liquids produced as a direct impact.
Provincial Tax Revenue does not include revenues in Table 7-20.

The treatment of the net revenue from sales gas as a contribution only to direct GDP points to an interesting issue: the difference in the way incomes earned from natural resource production are treated in national or provincial income accounts. Using GDP as the income measure focuses on the location of production, in this case the province of Nova Scotia, but not the ownership of the capital assets (the rigs, pipeline, gas plant, etc.) used in production. If an alternative measure, Gross Provincial Product (GPP), had been used, the value of net sales would not have been counted as income in Nova Scotia. The reason is that GPP only includes income earned by factors of production (labour, capital) owned by Nova Scotia residents. Since non-resident companies (ExxonMobil and partners) own the gas production facilities, the net revenue earned would therefore not be counted as part of GPP[27]. (See Appendix 4 for further discussion.) Noting this distinction helps to explain why a substantial increase in direct GDP from natural gas production will not have a huge impact on economic activity in the Nova Scotia economy.

[27] Note that a similar argument would hold for the direct GDP and GPP contributed by the Maritimes & Northeast Pipeline which is owned by Duke Energy (75%) and ExxonMobil Canada (12.5%), both non-resident companies, and Emera Inc. (12.5%). The latter is a Nova Scotia company, although its shares are widely held by both Nova Scotians and non-Nova Scotians. We have not pursued the issue in this case.

7.4 Exploration and Delineation Drilling

Exploration and delineation drilling expenditure was about $280 million during the period covered by this study. These expenditures are not part of the previous spending reported for Cohasset-Panuke or SOEP. The spending was comprised of about $180 million for the Deep Panuke wells noted previously and $100 million for SOEP exploration wells, arrived at as follows.

During the decade under examination, all of the drilling activities were associated with either the Cohasset-Panuke oil development or the SOEP natural gas project until 1999 and 2000. In 1998, PanCanadian (now EnCana) began to drill exploration wells for the Deep Panuke project. This project involved drilling through the previous Panuke oil field (at 2,000-3,000 meters deep) to the 4,000-5,000 meters level in search of natural gas. The spending for the two wells drilled in 1999 was included in the Cohasset-Panuke project expenditure discussed previously[28]. In 2000, PanCanadian drilled four wells at a total cost of about $180 million. Also in 2000, ExxonMobil drilled two exploration wells, Emma N-03 and Adamant N-97. The results of these wells remain confidential, as does the cost of the drilling activity. For purposes of this study, we have used an estimated cost of $50 million per well as a typical gross expenditure for wells with a depth in the 4,500 meter-plus range for a total expenditure of about $100 million. Hence, for the exploration drilling activity in 2000, we have added the economic impact of an additional $280 million of expenditure to complete the picture of offshore activities to the end of 2000.

Analysis of this direct spending indicates that one-quarter of the total spending or about $70 million was spent on materials, services and labour in Nova Scotia. The remaining 75% was imported directly from other parts of Canada and the rest of the world. The estimated direct employment generated was about 370 person years (Table 7-11). This was associated with household income of about $32.5 million. Taking into account the inter-industry purchases and the spending of income earned, spinoff employment added another 930 person years of employment to bring the total employment impact up to 1,300 person years. The associated gain of $31 million in household income increased the contribution to total household income to about $63 million. Including the non-labour income, spinoff GDP impacts are about $48 million, for a total GDP impact of just over $80 million.

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[28] Strictly speaking, this spending should be reported separately from the Cohasset-Panuke project. However, since it was included in the project spending reported in the Canada-Nova Scotia Benefits reports and how it is reported makes no difference to the impact analysis, it was dealt with as reported.

Table 7-11
Exploration Drilling Impacts
Gross Expenditure $280 Million

	Direct	Spinoff	Total
Employment (person years)	370	930	1,300
Household Income ($million)	32.5	30.6	63.1
Provincial Tax Revenue ($million)	4.5	4.7	9.2
GDP @ factor cost ($million)	32.5	48.0	80.5

Source: Gardner Pinfold Consulting Economists Limited

7.5 Natural Gas Pipelines

Maritimes & Northeast Pipeline (M&NP) Project

The transmission pipeline is 558 km in length, running from the gas processing plant at Goldboro, Nova Scotia to the New Brunswick - Maine border, near St. Stephen, New Brunswick.[29] About 234 km (42%) of this pipeline is located in Nova Scotia and 324 km (58%) in New Brunswick. These percentages were used to allocate the total spending between the two provinces, except for the meter station that was allocated entirely to Nova Scotia.

Planning for the mainline started in 1995 and construction was completed in the fall of 1999. The estimated total cost of the main pipeline was $544 million ($1996). The project had six components:

- **Material** – the cost of the pipe, valves, fittings, epoxy coatings, station equipment, pigs, corrosion protection, signs, trucking, natural gas and other miscellaneous materials;
- **Lay contract and stations construction** – the cost of installing and testing the pipe and constructing the gate stations;
- **Development costs** – the cost of the M&NP personnel and expenses, environmental, engineering and construction consulting services and other services;

[29] Maritimes & Northeast Pipelines is owned by affiliates of Duke Energy Corporation (75%), ExxonMobil Corporation (12.5%) and Emera Inc. (12.5%). The USA portion of the pipeline runs through Maine and New Hampshire to connect to the American natural gas grid near Dracut, Massachusetts.

- **Ancillary contracts** – the cost of professional services such as inspection personnel, survey and mapping, legal, radiography and construction field inspection;
- **Lands** – the cost of easements, frontage fees, permits, legal, appraisals, environmental screening and damages; and,
- **Financial** – the cost of financing charges.

Expected Economic Impacts

In the SEIS report for the M&NP pipeline, the estimated economic impacts were measured in terms of GDP at factor cost and employment, as shown in Table 7-12[30]. The Statistics Canada 1990 Interprovincial Open[31] Input-Output Model was used to estimate these impacts.

Table 7-12
Maritimes & Northeast Pipeline Project
Mainline Pipeline
Total Capital Cost, $1996 544 million
Expected Construction Phase Impacts

	GDP at factor cost ($1996 million)	Employment (jobs)*
Direct	N/A	N/A
Spinoff	N/A	N/A
Total #	97.9	1,090

Source: Washburn & Gillis Associates Ltd., *Proposed Maritimes & Northeast Pipeline Project, Country Harbour, Nova Scotia to St. Stephen, New Brunswick* Corridor Selection – Environmental and Socio-economic Impact Assessment, Annex 4, Socio-Economic Report, prepared for Maritimes & Northeast Pipeline Management Ltd. 1996.

Notes: * Employment was reported only in terms of jobs.
Reported only in terms of total impact for Nova Scotia and New Brunswick combined. The figure reported is estimated at 42% (the proportion of the pipeline located in Nova Scotia) of the combined impact.

No impact estimates were available for the operation phase.

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30 Only a total figure was given in the SEIS report.

31 The term open refers to the fact that the Statistics Canada model only estimates direct and indirect impacts. The model does not estimate the induced impacts from the spending of incomes earned directly and indirectly from the project.

Actual Economic Impacts

Actual spending for the M&NP main pipeline was reported at $742.8 million[32]. Analysis of the M&NP main pipeline direct spending starts by first identifying the portion that enters the Nova Scotia economy and the portion that is directly imported from other parts of Canada and the rest of the world. Based on the available information, total direct employment is estimated at about 1,030 person years and an additional 1,740 person years of spinoff employment, for a total of 2,770 person years (Table 7-13). Direct household income was about $118.9 million. Spinoff household income added another $73 million for a total impact of about $192 million. The direct impacts would have been spread across the construction period, but were mostly concentrated in 1999, the peak construction year. The spinoff impacts occur with some lag and would have spread into 2000.

Table 7-13
M&NP Development Impacts
Total Capital Expenditures, $742.8 Million

	Direct	Spinoff	Total
Employment (person years)	1,030	1,740	2,770
Household Income ($million)	118.9	72.9	191.8
Provincial Tax Revenue ($million)	16.6	11.0	27.6
GDP @ factor cost ($million)	118.9	111.8	230.7

Source: Gardner Pinfold Consulting Economists Limited

Pipeline Lateral Projects: Halifax and Point Tupper

Halifax

The Halifax lateral project, also owned by M&NP, involved the construction of about 121 km of transmission pipeline and related facilities in Nova Scotia from the tie-in to the M&NP mainline to the thermal generating plant at Tufts Cove, Dartmouth. Planning for the lateral started in 1997 and construction was completed in 2000.

[32] We assume that 42% of this expenditure occurred in Nova Scotia. This corresponds to the portion of the total Canadian pipeline that is located in Nova Scotia.

The estimated total cost of the lateral was $75 million ($1997). The project had six components:

- **Material** – the cost of the pipe, valves, fittings, epoxy coatings, station equipment, pigs, corrosion protection, signs, trucking, natural gas and other miscellaneous materials;
- **Lay contract and stations construction** – the cost of installing and testing the pipe and constructing the gate stations;
- **Development costs** – the cost of the M&NP personnel and expenses, environmental, engineering and construction consulting services and other services;
- **Ancillary contracts** – the cost of professional services such as inspection personnel, survey and mapping, legal, radiography and construction field inspection;
- **Lands** – the cost of easements, frontage fees, permits, legal, appraisals, environmental screening and damages; and,
- **Financial** – the cost of financing charges.

Expected Economic Impacts

The National Energy Board Facilities Application for the Halifax Lateral Pipeline Project contained economic impact estimates for the project[33].

The forecast split was materials/services 68% (or $51 million) and labour 32% ($24 million). Nova Scotia content was estimated to be 48% of the materials and services and 72% on the labour during the construction phase. This would translate into about 341 direct jobs for Nova Scotians. Table 7-14 shows the expected construction phase economic impacts.

[33] Maritimes & Northeast Pipeline, *Halifax Lateral Pipeline Project, NEB Facilities Application*, Volume 8, March 23, 1999; *Socio-Economic Impact Assessment*, Volume 9.

Table 7-14
Halifax Lateral
Capital Cost ($1997) 75 million
Expected Construction Phase Impacts

	Direct	Spinoff	Total
Employment (Jobs)	341	866	1,207
Household Income ($1997 million)	17.2	28.8	46.0
GDP @ factor cost ($1997 million)	18.1	30.4	48.5

Source: Maritimes & Northeast Pipeline, *Halifax Lateral Pipeline Project, NEB Facilities Application*, Volume 8, March 23, 1999; *Socio-Economic Impact Assessment*, Volume 9.

No impact estimates were done for the operations phase. The expected annual operating expenditures were about $236,000. On an incremental basis, the impacts would be small with most costs already being subsumed in the costs of operating the main transmission line.

Point Tupper

The Point Tupper lateral, owned by M&NP, runs about 59 km from a tie-in to the M&NP mainline pipeline approximately six km west of the gas processing plant at Goldboro to industrial users in Point Tupper. All but four km of this pipeline was constructed in the same trench as the SOEP natural gas liquids pipeline to the fractionation plant in Point Tupper.

The estimated construction cost of the pipeline and associated ancillary facilities was $20.85 million ($1999)[34]. Since most of the pipeline was to be constructed in the same trench and right of way as the liquid pipeline, the net cost of the lateral was estimated to be $5.25 million[35]. The operating cost was estimated to be about $84,000 annually.

The economic impact analysis considered only the incremental cost to M&NP for the lateral, that is $5.25 million, or about one-quarter of the total estimated cost of $20.9 million (Table 7-15). The analysis estimated that Nova Scotia business would supply about 45% of the material and service requirements and about 80% of the construction labour. This would translate into about $2.9 million in direct expenditure placed in Nova Scotia.

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[34] Maritimes & Northeast Pipeline, *Point Tupper Lateral Pipeline Project, NEB Facilities Application*, Volume 8, March 23, 1999; *Socio-Economic Impact Assessment*, Volume 9.

[35] This was the working assumption used in the SEIS for the Point Tupper Lateral Pipeline Project, which we have adopted for this study.

Table 7-15
Point Tupper Lateral
Total Capital Cost $20.9 million Gross; $5.25 million incremental
Expected Incremental Construction Phase Impacts

	Direct	Spinoff	Total
Employment (person years)	54	65	119
Household Income ($1999 million)	1.23	2.03	3.26
GDP @ factor cost ($1999 million)	1.29	2.12	3.41

Source: Maritimes & Northeast Pipeline, *Point Tupper Lateral Pipeline Project, Socio-Economic Impact Assessment*, Volume 9, March 1999.

Direct Nova Scotia construction employment was estimated at 54 jobs with associated wages and salaries of $1.23 million. There was no description of their duration but given the short length of the lateral, they would be short term. The associated spinoff income and employment were estimated at $2.13 million and about 65 jobs, respectively. No impact estimates were done for the operations phase as the incremental costs were small.

Actual Impacts – Halifax and Point Tupper Combined

Actual spending for the Halifax lateral and the Point Tupper lateral was reported as:

- **Halifax lateral:** $85.1 million[36]
- **Point Tupper lateral:** gross expenditure $33.2 million[37]

Incremental spending on the two laterals was about $93 million. Analysis of this direct spending indicates that 57% of the total spending of $93 million, or about $53 million, was spent on materials, services and labour in Nova Scotia. The remaining 43% was imported directly from other parts of Canada. The estimated direct employment generated was about 310 person years (Table 7-16). This was associated with household income of about $34.4 million. Taking into account the inter-industry purchases and the spending of income earned, spinoff employment added another 510 person years of employment and about $21.7 million of household income. Including the non-labour income, spinoff GDP impacts are about $32.8 million, for a total GDP impact of about $67.2 million.

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[36] This is the amount spent to the end of the study period, December 31, 2000. Clean up costs in 2001 added another $3 million.

[37] We treat only $8.3 million (25%) as incremental expenditure for the Point Tupper lateral, since the bulk of this pipeline was constructed in the same trench and right of way as the NGL line whose impacts are included in the SOEP analysis.

Table 7-16
M&NP – Laterals
Total Capital Expenditures, $118.3 Million
Capital Expenditures Impacts

	Direct	Spinoff	Total
Employment (person years)	310	510	820
Household Income ($million)	34.4	21.7	56.1
Provincial Tax Revenue ($ million)	4.8	3.3	8.1
GDP @ factor cost ($million)	34.4	32.8	67.2

Source: Gardner Pinfold Consulting Economists Limited
Note: We treat the Halifax lateral spending, $85.1 million, as wholly incremental spending and about 25% of the Point Tupper lateral spending or $8.3 million as incremental expenditure. So the direct spending that drives the economic impacts is $93.4 million.

7.6 Other Impacts

Exploration Licenses

During the decade (1990-2000), Nova Scotia issued 44 offshore exploration licenses with work expenditure bids valued at nearly $845 million (Table 7-17). At the end of the decade, 42 of the original licenses remained in effect.

Most of the interest in offshore exploration occurred late in the decade. Over 90% of the exploration licenses issued came into effect between 1998-2000. Approximately 89% of the $845 million in work expenditure bids occurred between 1998 and 2000.

Most of the exploration licenses that came into effect in 1998 were for shallow-water blocks around Sable Island. Exploration licenses issued during 1999 were for blocks in the vicinity of Sable Island as well as some blocks in deeper water to the southwest of Sable Island. Licenses issued in 2000 were mainly for deeper-water blocks on the south-central Scotian shelf.

Table 7-17
Summary of Exploration License Activity
1990-2000

Year	Licenses Coming Into Effect	Total Work Expenditure Bid ($million)
1990	1	2.6
1991	0	0
1992	0	0
1993	0	0
1994	1	1.0
1995	0	0
1996	1	86.4
1997	1	2.3
1998	8	94.2
1999	21	597.0
2000	11	61.2
Totals	**44**	**844.7**

Source: Canada-Nova Scotia Offshore Petroleum Board

The economic impacts associated with these licenses occur when the actual exploratory drilling takes place. Some of these impacts were reported above. Most of them will take place in years subsequent to the study period.

Seismic Operations

By far, 1998 through 2000 accounted for most of the seismic data-gathering activity – 97% of the 2D and 90% of the 3D data. It is not surprising that this is the same period that over 90% of the exploration licenses issued over the decade came into effect, since seismic is one of the first steps in exploring the ground covered by a exploration license. Spending on seismic data collection has not been assembled systematically for the study period and hence no impact analysis was undertaken. In any event, given the highly specialized nature of seismic work, it has a very low Nova Scotia expenditure content and consequently a modest impact on the Nova Scotia economy. The best available measures of seismic activity are the physical indicators shown in Table 7-18. The early years of the decade recorded a small amount of activity. This was followed by a period of inactivity and then the surge at the end of the decade.

Table 7-18
Summary of Seismic Data Gathered
1990-2000

Year	2D Km	3D Km^2
1990	134	107
1991	1600	116
1992	0	0
1993	0	0
1994	0	0
1995	0	0
1996	0	547
1997	908	1100
1998	30198.	1500
1999	40945.	6260
2000	4942	8896
Totals	**78728**	**18525**

Source: Canada-Nova Scotia Offshore Petroleum Board

Exploration Drilling

From 1990 to 2000 there were 51 wells drilled offshore Nova Scotia (Table 7-19), 12 (24%) for exploration or delineation[38] purposes, and 39 (76%) for the development of known fields. The economic impacts of the development and delineation drilling activity up to the end of 1999 were included in the impacts analyzed in sections 7.1 through 7.3.

All of these were related to the two development projects in the Nova Scotia offshore, Cohasset-Panuke and SOEP. From 1990 to 1998 the Cohasset-Panuke project accounted for all development and delineation wells drilled. In 1998, development began on Tier 1 of the SOEP. During this first year, 10 wells were drilled to develop the Venture and Thebaud fields. Overall, 73% of development and delineation wells drilled during the decade were attributable to the Cohasset-Project. The remaining 17% were drilled for the SOEP.

No exploration and delineation drilling occurred during the middle of the decade. This is closely correlated to the lack of seismic activities previously noted. Of the 12 wells drilled over the decade, two occurred in 1991 and 10 were drilled from 1998 to 2000.

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[38] A delineation well is a well drilled at a distance from a discovery well to determine the physical extent, reserves and likely production rate of a new oil or gas field. Sometimes a delineation well may also be a development well, that is, a well from which oil or gas will be produced.

There was a noticeable increase in the depth of the wells being drilled late in the decade. In the early 1990s, the development wells had an average depth of 2,415 meters (7,848 feet), and the exploration wells had an average depth of 2,713 meters (8,817 feet). By the end of the decade, the average depth for a development well had increased to 4,076 meters (13,247 feet) and the average depth for exploration wells had increased to 4,438 meters (14,425 feet) This represents an increase in depth of 69% for development wells and 63% for exploration wells.

Table 7-19
Summary of Offshore Wells Drilled
1990-2000

Year	Exploration/ Delineation Wells	Development Wells
1990	0	0
1991	2	4
1992	0	4
1993	0	10
1994	0	2
1995	0	1
1996	0	2
1997	0	2
1998	2	12
1999	2	1
2000	6	1
Total	**12**	**39**

Source: Canada-Nova Scotia Offshore Petroleum Board

7.7 Offshore Revenues

Offshore oil and gas activities can potentially generate revenues for the various levels of government. Here we are focusing mainly on the provincial government and municipal governments. For the provincial government, there are four sources of additional revenue which are derived directly from the offshore project owners: royalties; provincial sales tax (PST) and Harmonized Sales Tax (HST) after the HST was introduced on April 1, 1997; licenses and forfeitures;[39] and corporate income tax. Municipal governments will receive property and business occupancy tax revenues[40].

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[39] Forfeitures refers to payments made by companies that fail to live up to their work bid commitments or decide for some reason to give up their exploration license.

[40] The federal government may receive GST/HST revenue. Much of this revenue may come from businesses located in other provinces. Such activity is outside the scope of this study. In any event, GST/HST estimation is complicated by the fact that any tax liability resulting from offshore activity will likely be offset by input tax credits.

Royalties are generally regarded as the prime revenue source from offshore oil and gas. Like other jurisdictions with offshore petroleum resources, Nova Scotia has put in place an Offshore Petroleum Royalty Regime that is based on revenues and profits. The regime was designed to recognize the inherent risks in offshore oil and gas exploration, development and production. In designing the regime, the Nova Scotia government attempted to achieve two objectives:

- To encourage the development of existing discoveries; and,
- To strike a royalty regime that is fair to both industry and government.

The two projects that began to produce during the 1990s, Cohasset-Panuke and SOEP, each had their own specific royalty agreement. The Cohasset agreement was signed in December 1992, while the SOEP agreement was signed in 1996. In addition, the Nova Scotia government has created a generic royalty regime that will apply to future oil and gas developments. Appendix 5 provides an outline of how the royalty regimes apply to the revenue stream generated by the production and sale of oil and gas from fields developed in Nova Scotia.

Oil and natural gas are non-renewable resources. Once they are extracted from the ground and sold, there is no further chance to reap additional economic benefits unlike the case of renewable resources, where with adequate conservation practices, a future stream of income can be assured.[41] Thus, a legitimate concern for Nova Scotians is whether they will share adequately in the development and production of a non-renewable resource. The Nova Scotia royalty regime has been assessed and found to pass a set of reasonable tests of fairness and effectiveness[42].

Table 7-20 shows the direct revenue streams for the four sources over the period 1992-2000. From 1992 to 1999, Cohasset-Panuke was the main revenue source. In 1999, the SOEP began to produce natural gas almost at the same time that Cohasset oil production ceased. As can be seen, the royalty stream is the largest revenue source. Over its life, the Cohasset-Panuke project generated about $22.8 million in royalties, accounting for about 60% of the total gross revenues of $53.9 million. The next most important offshore revenue source was corporate income tax, which accounted for another 22%, or just over $12 million, most of it during the early years of the

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41 The situation is little more complicated than this description suggests since the future stream of income also depends on continuing markets for the renewable resource. These markets in turn depend on factors such as, for example, no changes in consumer preferences for the resource and no technology changes that render the resource or products based on it obsolete.

42 Campbell Watkins, *Atlantic Petroleum Royalties: Fair Deal or Raw Deal?* Atlantic Institute of Market Studies, 2001.

study period. PST/HST and Licenses & Forfeitures accounted for about 13% and 6%, respectively.

It is important to note that the tax revenues reported in Table 7-20 are gross revenues. That is, they are revenues received by the Province of Nova Scotia prior to any adjustment for federal equalization payments. The equalization formulae are very complex and need not be dealt with here in detail. It is sufficient to note that, prior to the agreement Nova Scotia struck with the federal government about the treatment of offshore revenues in the equalization calculations, any increase in offshore revenue would be offset by a decline in equalization payments almost on a dollar-for-dollar basis[43]. As Table 7-20 shows, over the study period Nova Scotia retained about $35 million or 65% of the offshore revenues. The remainder accrued to the federal government in the form of a reduction in equalization payments to Nova Scotia that would have been paid otherwise. As agreed with the federal government, Nova Scotia opted for a regime of certainty that was phased in during the 1990s. Over the study period, the equalization offset started at 90% and scaled down to its current fixed rate of 30%. That is, Nova Scotia will retain 30% of any future offshore revenues earned. It will remain at 30% so long as the current agreement remains in force.

Table 7-20
Province of Nova Scotia
Direct Offshore Revenues, 1992-2000

Provincial Revenue Source	$ million
Royalties – Petroleum	
Cohasset-Panuke	22.8
SOEP	9.3
PST/HST	6.7
Licenses & Forfeitures – Petroleum	3.1
Corporate Income Tax	12.0
Total	53.9
Estimated Equalization Offset Payment	35.2

Source: Nova Scotia Department of Finance, Tax Policy Division.
* Note: These are revenues collected directly from Cohasett-Panuke, SOEP and other offshore activity, as tracked by the Nova Scotia Department of Finance. They do not include revenues from, and are not included in, the spinoff impacts. Spinoff revenues reported in Sections 7.1-7.3 are estimated by the Nova Scotia Input-Output Model.
Prepared by Gardner Pinfold Consulting Economists Limited

[43] This is an approximation.

7.8 Municipal Taxes Paid on Gas Pipelines

Once they are in operation, gas pipelines are taxable assets for municipalities. So in the first full year of natural gas production, the following municipal governments received incremental property tax revenues:

- St. Mary's district
- Guysborough district
- Richmond County
- Pictou County
- Stellarton town
- Colchester County
- Cumberland County

The total property tax paid in the year 2000 was $6.5 million.

Although it falls outside the study time frame, we note that the Halifax lateral came into operation in 2001. So additional property taxes accrued to the Halifax regional municipality starting that year. Total property taxes paid on the gas pipelines during calendar year 2001 increased to $10.1 million.

There may have been further municipal taxes collected on the gas plant in Goldboro and the fractionation plant in Port Hawkesbury. However, we understand that the eligibility and assessed value for these facilities are under appeal and have therefore omitted them from the tax revenue calculation.

Another possible source of revenue is the assessed value effect, the additional revenue attributable to increased tax assessments on existing businesses resulting from offshore activities. There is anecdotal attribution of an increased assessment base in Halifax Regional Municipality resulting from offshore activity. It is difficult, however, to attribute empirically the effect of offshore activities on municipal tax collections from existing businesses. These tax collections are based on assessed value which, in a well-developed economy such as Halifax, may only be revised in response to offshore-related economic activity with a lag and if the activity is sustained at a high level over a long enough time. Neither the Cohasset-Panuke project nor the SOEP would seem to qualify. In any event, disentangling offshore-related effects from effects related to the general performance of the local economy will, at the very least, be difficult, if it is in fact possible. For a relatively less-developed economy such as Guysborough County, where the SOEP and pipeline facilities are new structures, the municipal tax revenue earned from these assets would be incremental and the assessed value effect is not likely to be a strong influence.

7.9 Industry Support and Community Investment Initiatives

In its 2000 Canada-Nova Scotia Annual Report, Sable Offshore Energy Incorporated (SOEI) points out that it has undertaken initiatives related to developing and supporting a viable and increasingly sustainable oil and gas industry in Nova Scotia. The expenditures made in support of these initiatives are part of the development and operations expenditures whose impacts were analyzed earlier in the report. As such, they do not represent additional impacts. They are reported here as a further example of how the offshore activities can permeate the broader economy and community, and generate a stream of benefits that will continue to accrue in the years following the study period. The initiatives can be divided into the four areas shown in Table 7-21.

Research and Development spending was more than $17.4 over the period 1995-2000 and was largely concentrated on addressing problems related to the SOEP development and production phases. Training and Education expenditure add up to almost $15.6 million between 1998 and 2000, the bulk of if for SOEI internal training and major contract training. Technology Transfer investments of about $9 million cover the transfer of equipment, skills and training to Nova Scotia related to SOEP development and production activities by SOEI and contractors working on the project. Spending on Diversity and Inclusion highlights the efforts of SOEI and its contractors to include the Aboriginal community, women and African-Nova Scotians in offshore activities.

Table 7-21
Sable Offshore Energy Incorporated
Industry Support and Community Investment Initiatives

Area	Activities	Expenditure	Observations
Research and Development	Research & Development Symposium/Workshop R&D Call for Proposals R&D Investments	About $17.4 million cumulative, 1995–2000	2nd annual workshop expanded to include broader industry representation 2nd call in 2000 for R&D proposals from universities and colleges for award in 2001
Training and Education	SOEI Internal Training Major Contract Training Co-op Programs Community Training and Educational Investments	More than $15.9 million, cumulative to the end of 2000	The bulk of the expenditure is for internal and contractor training; e.g., over 83% in 2000
Technology Transfer	Equipment or type of training that reflects knowledge, expertise and skills transferred to Nova Scotia and other parts of Canada	Almost $9 million to the end of 2000; 85% occurred in 2000	In 2000, the bulk of technology transfer occurred in SOEI's operations area and with rig companies
Diversity and Inclusion	Initiatives within SOEI, with contractors and with the Aboriginal community to expand the inclusion of Aboriginal workers in offshore activities Participation events and projects like Techsploration and Hypatia project to involve more women in non-traditional careers, an area of special interest in the oil and gas industry	About $172,000 in 2000	Support for the African-Nova Scotian community and the physically/mentally challenged community was also part of this area

Source: Sable Offshore Energy Incorporated, *2000 Annual Report, Canada – Nova Scotia Benefits*.
Note: Owner companies other than SOEI make some of the investments included here.

7.10 Increasing Nova Scotia Benefits

Increasing Nova Scotia benefits from offshore oil and gas activities is an ongoing concern for the public and the government of Nova Scotia. The government is limited in the actions it can take since the Canada-Nova Scotia Accord governs offshore developments and operations. The Accord calls for full and fair opportunity for Nova Scotia companies and labour to participate in supplying goods and services. However, it leaves the government little in the way of policy

options other than moral suasion to persuade the companies undertaking the offshore development to increase Nova Scotia content.

The government of Nova Scotia has recognized these limitations. In seeking to expand the benefits to the province and its citizens from offshore oil and gas development, it has adopted a policy of striking what might be called 'side agreements' with companies engaged in offshore activities. By the end of 2000, the government had negotiated two of these side agreements through memoranda of understanding:

- **Nova Scotia Market Development Agreement,** June 17, 1999

  At the time of signing, the parties to this agreement were the Province of Nova Scotia, Mobil Oil Canada Properties, Shell Canada Limited, Imperial Oil Resources Limited, Nova Scotia Resources (Ventures) Limited, Mosbacher Operating Ltd., and Sable Offshore Energy, Inc. The objective of the Agreement is to promote the use of natural gas, including SOEP gas, within Nova Scotia through the establishment of the Nova Scotia Gas Market Development Initiative. The strategy to do this is to develop gas markets by reducing the delivered cost of natural gas, including SOEP gas, which will be consumed in Nova Scotia during the first ten years following delivery of gas from the SOEP fields by the M&NP Canadian pipeline. Over the ten-year period, the SOEP is obligated to pay a total of $20 million to help fund the Market Development Initiative.

- **Scotia Benefits Fund Agreement,** June 17, 1999

  At the time of signing, the parties to this agreement were the Province of Nova Scotia and Sable Offshore Energy, Inc.(SOEI) The objective of the Agreement is to establish the Scotia Benefit Fund for the general purpose of benefiting the economy, people or government of Nova Scotia. The Fund would be created by a one-time gift from SOEI to Nova Scotia to recognize the costs Nova Scotia has incurred and will incur to build, maintain and improve its infrastructure for the benefit of the people of Nova Scotia, including the oil and gas industry and its related contractors and employees. The gift has a total value of about $14.1 million to be paid in equal annual amounts of $2.018 million over seven years starting on January 1, 2003.

From the point of view of this report, the benefits to Nova Scotia from the two Agreements will accrue after the study period.

8. Regional Impacts

This section provides an assessment of the regional distribution of impacts across the province, based on the experience with the SOEP. The assessment is based primarily on the Nova Scotia benefits information available from the Board, and on discussions with officials of the Petroleum Directorate (now the Nova Scotia Department of Energy), Offshore Onshore Technologies Association of Nova Scotia, Association of Professional Engineers of Nova Scotia and other industry sources. Points of discussion include the extent to which the offshore has stimulated the development of viable industry clusters, impacts on commercial and residential real estate markets and requirements for new infrastructure in communities affected by offshore energy development. Specific examples will be used where they can be documented. Since the SOEP information reported to the Board combines development and operations, the assessment deals mainly with the effects of the SOEP development phase, although the first year of operations (2000) is included in the information reviewed. It is recognized that the Cohasset-Panuke project and exploration activity will also have had some regional impacts. The study chose to use the SOEP as an indicator of regional impacts in part because of its relatively better documentation and its size.

8.1 Regional Distribution of SOEP Spending

A matter of some interest is how the SOEP spending was distributed geographically. Although a detailed geographical spending breakdown was not available to this study, Table 8-1 provides a first-level indication of where SOEP spending occurred. This is based on publicly available information that covers SOEP contracts for goods and services in excess of $50,000, but not the exact contract amounts. The table has three parts.

The first part shows that of the 513 contracts awarded up to the end of December 2000, 407 or almost 80% went to Canadian companies. Of these contracts, 200 or 49% were valued at more than $250,000. The 106 contracts awarded outside of Canada were split between the United States (75) and Europe (31). The contracts awarded to companies in Europe and the United States went to contractors in key centers, such as Aberdeen, Scotland and Houston, Texas that have established petroleum operations and the specialized management, technical and engineering capabilities required by the offshore industry.

In the second part, the table shows the provincial breakdown of the 407 Canadian contracts. Nova Scotia firms received 190 (47%) of these contracts, 80 (42%) of which had a value exceeding $250,000. Alberta (95 contracts) and Ontario (54 contracts) were the other main supplying provinces. Over two-thirds of the Alberta contracts had a value more than $250,000. There were 200 Canadian contracts with a value exceeding $250,000. Nova Scotia and Alberta account for 80 (40%) and 65 (32.5%), respectively. Contracts awarded to Alberta firms tended to be for specialized engineering, geophysical, and technical products and skills that have developed in conjunction with Alberta's petroleum industry.

Focusing only on the contracts awarded to Nova Scotia firms, Halifax Regional Municipality (HRM) companies attracted 159 (about 84%) of the total of 190 Nova Scotia contracts. Of these 74 (47%) were for amounts greater than $250,000. This was over 92% of the high-value contracts. Eight other counties shared the remaining 41 contracts and most of these were for amounts less than $250,000. This concentration is largely explained by the fact that large construction projects such as the SOEP and Cohasset-Panuke require a diverse and highly skilled labour force, and access to a transportation and industrial infrastructure. Because of the size and diversity of its economy, the HRM is well endowed to meet these demands.

In counties outside the HRM, there were 31 contracts (16% of Nova Scotia total) awarded for work on the SOEP. The majority of these contracts were for publishing, communications, public relations and advising services, with only a handful of the contracts going to manufacturing or fabrication companies.

Table 8-1
SOEP Contracts Greater than $50,000

Distribution of Contracts Greater than $50,000 Awarded				
	Number of Contracts	% of Total	Contracts >250K	%>250K
U.S	75	14.6%	36	48.0%
Europe	31	6.0%	15	48.4%
Canada	407	79.3%	200	49.1%
Total	**513**	**100%**	**251**	**48.9%**
Distribution of Contracts Greater than $50,000 Awarded in Canada				
	Total Contracts	% of Total	Contracts >250K	% >250K
Alberta	95	23.3%	65	68.4%
Newfoundland	21	5.2%	10	47.6%
Nova Scotia	190	46.7%	80	42.1%
Ontario	54	13.3%	21	38.9%
Quebec	21	5.2%	14	66.7%
Other	26	6.4%	10	38.5%
Total	**407**	**100%**	**200**	**49.1%**
Distribution of Contracts Greater than $50,000 Awarded in Nova Scotia				
County	**Total Contracts**	**% of Total**	**Contracts >250K**	**% >250K**
Antigonish	5	2.6%	1.00	20.0%
Cape Breton	6	3.2%	1.00	16.7%
Colchester	3	1.6%	1.00	33.3%
Guysborough	9	4.7%	2.00	22.2%
Halifax*	159	83.7%	74.00	46.5%
Hants	4	2.1%	1.00	25.0%
Lunenburg	2	1.1%	0.00	0.0%
Queens	1	0.5%	0.00	0.0%
Shelburne	1	0.5%	0.00	0.0%
Total	**190**	**100%**	**80**	**42.1%**

* Corresponds to Halifax Regional Municipality

Source: Sable Offshore Energy Project, *2000 Annual Report, Canada-Nova Scotia Benefits*, based on SOEP cumulative expenditures to December 31, 2000.

Detailed spending information is not available at the sub-provincial level. However, as shown in Table 8-2, it is possible to make some plausible inferences about the distribution of spending across Nova Scotia. Starting from the actual Nova Scotia expenditure of $795.2 million reported by SOEP[44], the average value of the 190 Nova Scotia contracts was almost $4 million. For analytical purposes, assume that all 110 of the projects with values ranging from $50,000 to $250,000 were actually valued at $250,000. This would imply that these projects had a gross value of about $27.5 million[45]. As a result, we can conclude that the 80 contracts with values exceeding $250,000 (call them large contracts) had an aggregate value of at least $767.7 million and an average value of at least $9.6 million.

Table 8-2
SOEP Approximate Value of Contracts by Area, Halifax and Other Nova Scotia

Area	Total Contracts	Large Contracts	Small Contracts	
Halifax	159	74	85	
Other NS	31	6	25	
Total NS	190	80	110	
	Contracts by Area	**Value of Large Contracts**	**Value of Small Contracts**	**Total Value of Contracts**
Halifax	159	710.1	21.3	731.4
Other NS	31	57.6	6.3	63.8
Total NS	190	767.7	27.5	795.2

Source: Gardner Pinfold Consulting Economists Limited
Note: Totals may not add due to rounding. Large Contracts are those with a value greater than $250,000; small contracts have a value between $50,000 and $250,000.

Applying the $9.6 million average value to the large projects and $250,000 to the small projects indicates that about $731 million (92%) of the spending in Nova Scotia was awarded to businesses with an HRM address[46]. Large projects account for most of this spending.

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44 As reported in the *2000 Annual Report, Canada-Nova Scotia Benefits*

45 Although this is clearly an overestimate, it is not really important for this discussion.

46 This distinction is made to allow for the fact that some of this work could still take place outside of HRM through sub-contracts or purchasing of goods and services inputs from non-HRM companies.

8.2 Offshore Impacts at Four Locations

This section examines offshore impacts at the following locations:

- Halifax Regional Municipality: General base of operations.
- Woodside Industrial Park: Site of the construction of wellhead jackets and the middle deck for the North Triumph field.
- Sheet Harbour: Site of the Shaw & Shaw Ltd. pipe-coating facility.
- Goldboro Area: Site of the SOEP gas plant and the beginning of the Maritimes & Northeast Pipeline.
- Point Tupper Area: Site of the NGL fractionation plant.

Halifax Regional Municipality

The Halifax-Dartmouth area accounted for the bulk of the provincial activity related to offshore oil and gas development. As outlined earlier, about 84% of the SOEP Tier 1 contracts awarded to companies in Nova Scotia went to companies with an address in Halifax Regional Municipality (HRM). The proximity of a skilled labour force, availability of commercial and residential infrastructure and access to an established transportation network and supply base make the HRM an attractive place to base the development and construction of offshore projects.

Over the decade a number of oil and gas exploration and development companies have opened or expanded regional offices in Halifax. To supply the needs of these companies there has been a corresponding increase in the number of companies supplying or servicing offshore development. At the end of the decade the Yellow Pages listed four sections under the heading of "Oil-Offshore"; "Construction"; "Service"; Equipment and Supplies"; and, "Technical Services".

The economy of HRM received a noticeable boost during the planning and construction phase of the SOEP. Restaurants, hotels and transportation services (i.e., car rentals and taxis), all reported increases in business directly attributable to increased business activity related to offshore development.

Demand for retail and residential real estate also increased. During the development phase for the SOEP (1996-1999), the vacancy rate for residential accommodation in Halifax fell from 8.6% to 3.6%. This was not wholly attributable to the SOEP but it would have been a significant factor. It was also noted that there was an increase in demand for high-end homes, and condominiums in the $150,000 to $250,000 range. Informed observers of the real estate market suggest that this

was due to the influx of executives and other high-level managers associated with offshore businesses.

Starting from about 16% in 1996, the vacancy rate for office space in the downtown core of Halifax decreased steadily through to 2000[47]. During this period, numerous engineering firms and exploration and development companies established offices in the downtown area. Royal LePage[48] pegged the 2000 vacancy rate for office space in downtown Halifax at 6.4%. The rate has continued in the 5-6% range since 2000. Although it is unlikely that offshore development is the sole factor contributing to changes in the Halifax real estate market, it is safe to say that the industry has had a significant impact.

Woodside Industrial Park – Halifax Regional Municipality

The Woodside Industrial Park and its associated wharf facilities played an important role during the construction and development of Hibernia (Newfoundland), Cohasset-Panuke and SOEP Tier I projects. MM Industra/Brown and Root used the facilities during the construction of wellhead drilling jackets as well as for the construction of the North Triumph middle deck. Fabco/CKT used the facilities during the construction of the offshore platform accommodation modules. In addition, facilities at the industrial park were used for fabricating and shipping many of the components required for the gas plant in Goldboro and the fractionation plant in Point Tupper.

Woodside Industrial Park was established in the late 1950s; however, the park's conversion to ocean industries did not take place until the signing of the Canada-Nova Scotia Subsidiary Agreement for Ocean Industry Development in July 1981. Currently, the industrial park is administered jointly by the Nova Scotia Department of Transportation & Public Works and Nova Scotia Business Inc.

The Woodside Industrial Park Wharf Facility was built in two stages, in 1983 and 1986, and was funded through the Offshore Development Fund. The facility is a concrete crib-type wharf which is approximately 228 meters (749 feet) long, with 9.75 meters (32 feet) width at the south end and 14.6 meters (48 ft.) at the north end. The minimum draft is approximately 8.8 meters (29 feet) at

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[47] Halifax Regional Municipality, *Development Statistics and Trends* – 2000; Colliers International, *2001-2002 Canadian Real Estate Review*.

[48] Vacancy rate information can be found at http://www.royallepage.com/en/marketinfo/upload/national_re_market_intelligence.pdf

the berth face at low tide. The top of the wharf is 4.57 meters (15 feet) above Chart Datum, and is backed by an asphalt-paved approach.

Over the past decade, minor improvements have been made to the wharf area and buildings in the vicinity. Within the industrial park, lots 203, 202A and the common-use wharf facility are the principal sites used by companies doing work on offshore projects.

Table 8-3 provides breakdowns of site owners over the past decade and describes the capital improvements that were completed to the area. The turnover in ownership may be an indicator of the "lumpy" nature of offshore energy projects in Nova Scotia so far. Businesses thrive during the construction period, which tends to be short and intense, and then encounter difficulty when the construction period is over, especially if they are single-operation firms.

Table 8-3
Major Land Owner Activity in Woodside Industrial Park
1990 - 2001

Time Period	Company	General Activities	Site Improvements
1990-1996	M&M Manufacturing	➢ General offshore and marine contracts ➢ Constructed the utility shaft modules for Hibernia as well as the topside facilities for the Cohasset and Panuke structures	➢ In 1993 the Nova Scotia Government paid for in-filling on the north end of the wharf ➢ M&M Manufacturing expanded the buildings in the area
1996-1999	MM Industra	➢ Offshore and Marine Contractors ➢ Constructed two wellhead drilling jackets for the Thebaud and Venture platforms ➢ Constructed North Triumph middle deck	➢ In 1998 the Nova Scotia Government paid for approx. 3/4 of an acre to be in-filled to increase the size of the laydown area for the construction of SOEP components ➢ MM Industra expanded and improved the buildings on the site
1999-2001	Banc Industries	➢ Manufactured emissions scrubbers and ductwork for US power plants.	➢ Expansion of offices and shop areas
2001-Present	Irving Shipbuilding Ltd.	➢ Completing the retrofitting of the Eirik Raude drilling rig	➢ Cost-shared agreement between Irving and Nova Scotia Government to upgrade the electrical system on the wharf and install a new heavy-load anchoring system

Source: Gardner Pinfold Consulting Economists Limited

Sheet Harbour Area – Halifax Regional Municipality

During the construction of the SOEP Tier 1, the Sheet Harbour Industrial Park was the site of the Shaw & Shaw Ltd. pipe-coating facility. The facility treated hundreds of kilometers of 12 to 26 inch diameter pipe with concrete and anti-corrosion coating for the sub-sea component of the project. The operation lasted from May 1998 to November 1998 and employed approximately 200 people.

Sheet Harbour Industrial Park was constructed in 1987, and is located 118 km northeast of Halifax. The park features a deepwater seaport as well as a large water lot and accompanying wharf. The park, including the wharf, roads, two buildings, and a laydown area, cost approximately $9.2 million to build, and was paid for through the Offshore Development Fund. The Nova Scotia Department of Transportation and Public Works, and Nova Scotia Business Inc., jointly administer the facility.

In 1998, the provincial government spent $1.0 million expanding and upgrading the industrial park for Shaw & Shaw Ltd. pipe-coating operations. This money was spent on clearing, leveling, grading and graveling approximately 15.2 hectares (38 acres) for a pipe yard. Shaw & Shaw Ltd. constructed two buildings on the site, which totaled 1,755 square meters (19,500 square feet) and rented a third, 810 square meters (9,000 square feet) building. During the pipe coating operations the site was rented under a short-term lease. When the contract was finished, Shaw & Shaw Ltd. entered into a token lease arrangement with the Nova Scotia government to ensure that they had future access to the site. Shaw & Shaw Ltd. has since bought the property, indicating potential plans to continue utilizing the site after the completion of the SOEP Tier 2 pipe-coating contract.

The pipe-coating contract provided a temporary boost to the economy of the Sheet Harbour area, with local individuals filling many of the available jobs. An observer suggested that the unemployment rate in the area surrounding Sheet Harbour dropped significantly during operation. Many individuals also temporarily relocated to the area to work at the facility. Local motel and rental accommodations reported high occupancy rates, and many local homeowners took on boarders to supplement their income. Restaurants, grocery stores and hardware stores also enjoyed increased levels of sales during the operation of the facility.

The pipe-coating operation provided many unemployed and underemployed individuals in the Sheet Harbour area with valuable training and work experience. The increase in employability of

the local workforce is perhaps the most important benefit that the pipe-coating facility contributed to the Sheet Harbour area.

Goldboro Area – Guysborough County

The Goldboro Industrial Park is the landfall site for the Sable natural gas sub-sea pipeline and home to the $200 million SOEP natural gas processing plant. Construction of the plant began in the fall of 1997 and was finished in mid-1999. Operations began in late 1999.

The Goldboro Industrial Park was established in 1998 as a result of the development of the SOEP gas plant. The Nova Scotia Department of Natural Resources donated 700 acres of land to make the park possible. The park is in the early stages of development, and there has been little infrastructure (i.e., sewer, lighting, water) development to date. Presently, the SOEP gas plant is the sole tenant in the park. A number of sites within the park have been optioned, but development has yet to occur.

One of the major advantages that the park has marketed is the ability to offer tenants a special "Goldboro Bypass Option". The option provides investors in the park with an opportunity to buy natural gas cheaper than any other place along the Atlantic seaboard. Bypassing the main transmission pipeline means bypassing the toll and the savings are subsequently passed on to tenants in the park.

Impacts During Construction

The construction of the SOEP plant provided a boost to Guysborough County, and to the communities in the Country Harbour area. At peak construction, approximately 550 people worked on the project, of which 125 were residents of Guysborough County. Approximately 200 people moved into the area to work on the project and the remainder commuted in from adjacent counties. Individuals who relocated to Guysborough County during the construction phase lived in communities throughout the County. Motels and apartments reported low vacancy rates, and many homeowners in the area took on boarders. As a result of increased economic activity in the area, retail stores and restaurants throughout the County enjoyed increased levels of sales.

There were minor infrastructure improvements in the area to facilitate the construction of the gas plant. The Goldboro wharf was upgraded in order to handle increased loads experienced during the construction phase, the wharf can now handle loads of up to 200 tonnes. In addition,

improvements were made to the electrical and telephone (both landline and cell) infrastructure in the area.

Numerous suppliers to the SOEP gas plant project set up supply bases during the construction of the gas plant; however, no suppliers remained in the area upon completion of the project.

Impacts During Operation

The Goldboro gas plant has been in operation since the end of 1999. Of the 82 people hired by SOEI as Operations Associates, 40 were from Guysborough County. These individuals work at the gas plant, fractionation plant and on the offshore production platforms.

Approximately 30 individuals work at the gas plant. The staff is mainly made up of skilled maintenance personnel, supported by a small administrative staff. Individuals working at the gas plant live in communities throughout Guysborough, Antigonish and Pictou counties.

In addition to providing local employment opportunities, the gas plant and the pipeline provide significant property tax revenue to the municipalities of St. Mary's and Guysborough. An increase in the tax base has allowed the municipality to complete infrastructure improvements, such as the sewer upgrade in Dover, and the waterfront and sidewalk upgrades in Goldboro.

Offshore Support

In 1998 the Guysborough County Regional Development Authority sponsored a SeaFarers Training Program. The program arose out of the recognition that fishermen possessed many of the skills and qualities desirable for work on offshore supply and service vessels, but required formalized training and certification. Of the 17 individuals who graduated from the program, 14 subsequently found related employment with Secunda Marine and Atlantic Towing. Today, approximately 60 individuals from Guysborough County work on supply and service vessels operating in the offshore.

Point Tupper Area – Richmond County

The Point Tupper Industrial Park is home to the $50 million dollar SOEP fractionation plant. The plant processes the natural gas liquids (NGLs) that are extracted during processing at the Goldboro gas plant. The NGLs are shipped to the fractionation plant via a 58 km, 8-inch pipeline. Each day the fractionation plant processes approximately 3,180 cubic meters (20,000 barrels) of NGLs into propane, butane and condensate. These products are sold into international markets.

Butane is shipped by rail, propane is shipped via rail and truck, and condensate is transported by ship. Statia Terminals Canada Incorporated provides about 80,000 cubic meters (500,000 barrels) of dedicated tank storage as well as access to dock facilities for shipping the condensate.

In addition to the liquids line, an 8-inch natural gas pipeline also runs to the Point Tupper Industrial Park. The line is owned by Maritimes & Northeast Pipeline, and began to provide a fuel source in mid-2001 for the fractionation plant as well as two additional customers: Stora Enso, a pulp and paper plant; and, Canadian Gypsum Company, a manufacturer of gypsum wallboard and building materials.

The Point Tupper Industrial Park was established in the late 1960s. The park is located approximately 287 km northeast of Halifax, on the southern tip of Cape Breton Island. The construction of the Canso Causeway, linking Cape Breton Island to mainland Nova Scotia, created one of the best deep-water year-round harbours on the Atlantic coast of North America. The main harbour of the port is capable of accommodating Ultra Large Carriers of the 500,000 tonne class. The port is a major shipping point for petroleum products, newsprint and fine paper, and gypsum and wallboard.

Impacts During Construction

The fractionation plant was constructed in 1999. At peak, 450 workers were involved in the construction phase of the facility. The majority of the labour force working on the project was unionized, and commuted to the site from throughout Cape Breton and to a lesser extent from the nearby mainland counties of Guysborough and Antigonish.

A handful of fabricators and suppliers set up in the area during the construction of the fractionation plant. These operations provided temporary employment opportunities for local individuals. Retail stores, rental accommodations and restaurants also saw an increase in sales during the construction phase.

The Point Tupper area has one of the largest concentrations of heavy industry in Nova Scotia, and the industrial park has experienced significant expansion in the recent past. In 1998 construction was completed on the new Stora Enso paper facility. This was an $800 million dollar project that employed over 4000 people during peak construction[49]. By comparison, the capital cost of the

[49] Personal communication, Louis Digout, Chief Administrative Officer, Municipality of the County of Richmond.

SOEP fractionation plant was only 6.3% of the cost of the Stora Enso facility. The impacts of the construction of the fractionation plant had a minor impact on the local area relative to impacts experienced with the Stora Enso project. Few infrastructure improvements were needed in order to accommodate the fractionation plant. The roads, water, sewer, electrical, telecommunication, and transportation systems were already in place to service existing industries.

Impacts During Operation

The fractionation plant began operating in January 2000. Approximately eight maintenance staff work at the facility, with the administrative and management functions for the fractionation plant handled from the Goldboro gas plant office. To put the size of the operation into a regional perspective, over 800 people work at the adjacent Stora Enso pulp and paper facility.

A healthy and diversified economy in the Point Tupper area provides a solid tax base for Richmond County. Approximately 5% of the County's property tax revenue comes from the assessment on the fractionation plant. By contrast, a considerably larger portion of the tax base for Guysborough County comes from the gas plant in Goldboro. This is primarily because of the relatively small industrial tax base in Guysborough County.

9. Capacity Development

This section outlines the instruments used by the government of Nova Scotia to promote industrial benefits and business development, to support labour force training, and to supply physical infrastructure related to the offshore.

9.1 Infrastructure Development

In November 1984 the federal government and the government of Nova Scotia created the $200 million Offshore Development Fund. The fund was established pursuant to the signing of the Canada-Nova Scotia Oil and Gas Agreement Act. This act provided the first legislation for offshore oil and gas resource management and revenue sharing, and was meant to provide a stable and predictable framework for exploring and developing the offshore area. The fund was to be used to finance infrastructure costs directly or indirectly relating to the exploration, development, production or transportation of oil and gas in the offshore area of Nova Scotia. The investments were to be made by the Province and then, upon review, reimbursed by the federal government through the Offshore Development Fund.

Although much of the fund-related activity occurred prior to the decade of concern for this study, it is important to take note of it for several reasons. In effect, it represents a pre-spending of the royalties that could be expected from the production of offshore oil and gas. Much of the spending was for infrastructure and training whose benefits could only be realized during the 1990s, since there was no project development under way during the 1980s.

As of October 25, 1989, the provincial government had granted spending authorization for $187 million, and at the end of 1989, over $158 million of the $200 million fund had been paid out. This left $12.6 million or 6.3% of the fund for future projects. By 1990 the majority of the fund was used up. Table 9-1 breaks down the authorizations and expenditures of the Offshore Development Fund as of July 1989.

Table 9-1
Breakdown of Offshore Development Fund Expenditures up to July 1, 1989.

Project Name	Authorized	% Distribution	Claimed
Industrial Infrastructure			
Woodside Industrial Park	$14,000,000		$8,500,000
Sydport Free Trade Zone	$2,000,000		$0
North Sydney Park - Phase 1	$1,082,835		$1,082,835
North Sydney Park - Phase 2	$2,600,000		$2,600,000
Pictou Wharf	$5,301,684		$5,301,684
Sheet Harbour Industrial Park	$9,200,000		$9,200,000
Dartmouth by-pass	$14,310,000		$14,310,000
West Petpeswick Bridge	$1,516,072		$1,516,072
Highway 125	$3,194,719		$3,194,719
Sydport Access Road	$8,247,200		$8,247,200
Woodside Ferry	$8,850,000		$8,850,000
Computer Traffic Control	$2,300,000		$1,000,000
Sheet Harbour-Stellarton Hwy.	$20,000,000		$18,000,000
Trenton Wharf	$7,200,000		$10,000
Trenton Connector Highway	$2,614,500		$2,614,500
West Hants Sewer & Water	$2,000,000		$1,600,000
Cossitt Heights Park	$1,000,000		$700,000
Other	$1,109,831		$1,109,831
Total	**$106,526,841**	**57**	**$87,836,841**
Industrial Assistance			
Pictou Industries Limited Marine Railway	$1,380,000		$1,380,000
Heavylift Transport	$1,000,000		$1,000,000
Shipyard Assistance Programs	$19,220,000		$10,000,000
Other	$2,843,638		$2,323,638
Total	**$24,443,638**	**13**	**$14,703,638**
Research and Development Training			
Vocational Training	$17,294,941		$17,294,941
Institute of Technology	$5,421,425		$5,421,425
Secondary Education Infrastructure	$1,994,475		$1,994,475
University Training	$16,200,000		$16,200,000
High-Tech Industry and Infrastructure	$1,500,000		$1,500,000
Other	$334,494		$334,494
Total	**$42,745,335**	**23**	**$42,745,335**
Health Infrastructure			
St. Martha's Hospital	$5,000,000		$5,000,000
Other	$330,000		$330,000
Total	**$5,330,000**	**3**	**$5,330,000**
Resource Development and Planning			
Staff Services - Material and Equipment	$1,734,641		$1,734,641
Other	$2,533,700		$2,533,700
Total	**$4,268,341**	**2**	**$4,268,341**
Other			
Land Servicing	$4,000,000		$4,000,000
Total	**$4,000,000**	**2**	**$4,000,000**
Total - Offshore Development Fund	**$187,314,155**	**100**	**$158,884,155**

Source: Offshore Development Board's, Approved Projects - Canada-Nova Scotia Development Fund Status Report, 1989.

Approximately 57% of the $200 million fund was allocated to build industrial infrastructure. Research and development training accounted for about 23% of the allocated funding and Industrial Assistance for about 13%. The rest was distributed across Health Infrastructure, Resource Development, and Planning and Land Servicing.

Although there were some concerns about relevance and appropriateness, some of the investments made by the Offshore Development Fund did have a reasonable relationship to offshore development. Investments made in shipyard assistance and industrial park development programs did provide lasting benefits and did improve Nova Scotia's capability to capitalize on opportunities presented by the offshore. Woodside Industrial Park and Sheet Harbour Industrial Park are prime examples. In the mid-1980s, approximately $25 million was spent on developing and upgrading these sites; both played a significant role in realizing Nova Scotia fabrication work during the development phase of the Sable Offshore Energy Project.

9.2 Training and Skill Development

A skilled and knowledgeable workforce is another important component of developing Nova Scotia's offshore oil and gas industry. Table 9-2 provides a breakdown of training and development programs supported by the Nova Scotia government in the 1990-2000 period. Some of these programs were fully or partially funded from the remaining resources in the Offshore Development Fund. Other programs were funded through a combination of the provincial and federal governments, industry associations and trade associations. The Offshore Development Fund has now been fully spent, and is now in the final stages of being closed out. As can be seen from the table, many of these initiatives are still relatively new. Thus, allowing for the usual startup delays, it is still very early to assess their accomplishments. Moreover, tracking and monitoring data are still in the early stages of data collection.

Table 9-2: Government (Provincial) Sponsored Offshore Training and Development Programs: 1990-2000

Agency/Program	Year Established	Estimated Cost	Nova Scotia Government Contribution	Nova Scotia Contribution % of Funding	Purpose
Nova Scotia Community College-Instrumentation Technology Program	1999	$670,000	$450,000	67%	➢ Established to respond to the oil and gas industries demand for advanced instrumentation expertise
Nova Scotia Community College -Gas Technicians Program	1999	$300,000	$250,000	71%	➢ Provide training for the installation of gas appliances and other services required to link individual homes and business to natural gas
University College of Cape Breton – Petroleum Centre of Excellence	1999	$1,000,000	$600,000	60%	➢ Development of a Center of Excellence in Petroleum Development and Education. ➢ Center offers diploma and bachelor degree granting programs in petroleum technologies and engineering
Atlantic Canada Petroleum Institute (now Petroleum Research Atlantic Canada)	1999	$1,250,000	$375,000	30%	➢ Provide a forum to address issues affecting the East Coast energy industry ➢ Pursue research and development initiatives
Energy Training Program for Students	1998	$1,100,000 over three years	$1,100,000 over three years	100%	➢ Wage subsidy program to encourage private sector companies directly involved in the oil and gas sector to create jobs and provide educational opportunities for Nova Scotia post secondary students and recent graduates
Nova Scotia Community College Atlantic Center for Electrical Technologies	1998	$1,200,000	$1,200,000	100%	➢ First facility in North America to train electricians to work in offshore environments
DalTech – Centre for Petroleum Engineering	1998	$4,400,000	$1,500,000	36%	➢ Program designed to provide professional engineering education and research with a particular focus on Atlantic Canada's oil and gas industry
Welding Training Course	1998	$1,051,741	$190,000	18%	➢ Program used to train 160 welders for the construction of the M&NP pipeline project
Heavy Equipment Operator Training	1998	$1,225,991	$250,000	20%	➢ Program used to train heavy equipment operators for the construction of the M&NP pipeline project
Skills Transfer Programs (various programs) See Appendix 5 for detailed list.	1998-2000	$2,435,655	$1,360,829	56%	➢ 16 separate projects funded in part by the provincial government in order to facilitate educational and skill transfer opportunities for companies involved in Nova Scotia's offshore
Radar and Navigational Aid Simulator	1990	$1,343,000	$1,343,000	100%	➢ Government grant used for the purchase and installation of a radar and navigation aid simulator for training commercial marine masters and mates
Survival Systems Ltd	1994	$700,000	$700,000	100%	➢ Government grant used to build an onshore training platform for safety training related to the offshore

Source: Nova Scotia Department of Energy

9.3 Nova Scotia Success Stories

There are numerous examples of Nova Scotia companies that have successfully capitalized on opportunities presented by offshore oil and gas development. Four examples are ACCENT Engineering, Secunda Marine, Jacques Whitford Environment Limited and Mulgrave Machine Works Limited.

ACCENT Engineering

ACCENT Engineering Consultants Inc was formed in January 1997. The company grew from the merger of three existing Nova Scotia engineering companies: CBCL Limited; Neill and Gunter Limited; and, Lewis Engineering Inc. Today, the combined ACCENT Engineering employs approximately 300 people.

The companies merged as part of a strategy to gain the maximum leverage of their respective skills to win offshore oil and gas engineering contracts. They were awarded contracts for the design of the fractionation plant at Point Tupper, the preliminary design and tender package for the living quarters modules and helidecks for the Venture and Thebaud platforms as well as the design of the gas plant administration building at Goldboro. The contracts were competed on time and within budget. The company was recently awarded the Lieutenant Governor's Award for Excellence in Engineering.

Jacques Whitford Environmental Limited

Jacques Whitford was formed in 1972, and opened its corporate head office in Dartmouth. Today, the company is the largest private environmental consulting company in Canada, and has offices around the world. The company has completed a variety of environmental permits and regulatory work for several exploration companies including PetroCanada, Shell, Husky, PanCanadian (now EnCana), Marathon, Kerr-McGee, and Canadian Superior.

In an effort to expand their product offering and better serve the offshore industry, Jacques Whitford has formed joint ventures with a number of companies. Joint ventures included:

- **Fugro Jacques Geosurveys Inc. (FJGI):** Formed in the early 1980s to supply marine geomatics services. FJGI has supplied marine geomatics services since the early 1980s; its portfolio of marine-related projects is unparalleled on the East Coast of Canada. FJGI now incorporates Jacques Whitford's Atlantic Canada geotechnical expertise with the world-leading technological capabilities of Fugro and has completed 98% of all Atlantic Canadian offshore geotechnical projects.
- **ATL-JW Consulting Inc:** Formed in 1997 to expand Jacques Whitford's capabilities into asset integrity management services and maintenance excellence solutions for offshore platforms.
- **The Offshore Waste Management Group:** Formed in 1998 to provide integrated waste management services for offshore oil and gas projects throughout Atlantic Canada.
- **EM&I Jacques Ltd.:** Formed in 2000 to develop the Asset Integrity Management Services business in Canada through provision of specialized marine inspection services.

Jacques Whitford Environment Ltd. is continuing to expand its workforce by 50% to 1,500 people by 2005. Providing comprehensive environmental and geotechnical services to the petroleum industry is a key component of the company's growth strategy. The company has plans to open a Houston office and to continue to grow its Halifax, St. John's and Calgary operations.

Secunda Marine

Secunda Marine began in 1983 with an office in Halifax, one supply vessel and a contract with PetroCanada. By the end of 2000 the company employed over 600 people, owned 15 vessels and had offices in Nova Scotia, Newfoundland and Barbados, and operated globally.

The company's diversified growth strategy has allowed it to expand rapidly, even during downturns in the offshore industry. After a downturn in oil activity in the late 1980s, Secunda began to convert ships for other operations, including carrying containers and passengers. Ship retrofits and upgrades, as well as work in the North Sea and Pakistan, allowed the company to continue to grow.

The emergence of the Cohasset-Panuke project in the early 1990s provided a major boom for Secunda. The company had three vessels working on the project and long-term contracts with Lasmo ensured a secure cash flow which allow Secunda Marine to continue to expand.

Today, the company has 17 vessels. About 75% are offshore boats, including a seismic vessel and a container/cargo ship. In addition, the company owns three cable-laying vessels, and has completed telecommunication cable-laying projects around the world.

The recent upturn in oil and gas activity in the offshore has provided increased opportunities for Secunda marine to operate locally. Presently the company has eight of its vessels operating off the East Coast of Canada. In addition, the company has built five ships in the last three years, with the majority of them used to service the oil and gas sector. The company buys the hulls and then custom builds the remainder of the vessel. Plans are currently in place to build an additional two vessels.

Mulgrave Machine Works Ltd.

Mulgrave Machine Works Ltd. was started in Mulgrave, Nova Scotia in 1969. Since its inception, the company has had close ties to the offshore oil and gas industry. In the early 1970s, Shell, PetroCanada and Home Oil had supply bases in the Mulgrave area to support exploration programs on the Scotian Shelf. Mulgrave Machine Limited started working in the offshore by performing service work for the exploration operations, which were operating from the area.

In the late 1980s, the company was awarded a $5 million skid fabrication contract for the Cohasset-Panuke project. This marked the beginning of a new era. The size and complexity of the project was unprecedented for the company. Quality certifications, health and safety assurances and project management became an integral part of the company's growth strategy. In addition, the company formed joint ventures with local instrumentation, electrical and pipe-coating specialists to complete the specialized work required for many of the offshore components. The experiences, reputation, working relationships and qualifications gained as a result of working on the Cohasset-Panuke project improved the company's marketability for bidding on future offshore contracts.

The company was awarded a number of fabrication and retrofit contracts for exploration and drilling rigs throughout the past decade, including a substantial contract for work on the Rowan Gorilla V drilling rig. As well, the company was awarded contracts for the fabrication of pressure vessels for the SOEP gas plant. In 1997, in anticipation of increased work as a result of offshore development, the company purchased additional shop space, effectively expanding their operation from 1,350 square meters (15,000 square feet) to over 3,600 square meters (40,000 square feet). Depending upon workload, between 40 and 70 people work for Mulgrave Machine Works.

10. Conclusions and Recommendations

The findings and conclusions of the study provide the basis for some observations and recommendations for consideration in future provincial government economic planning related to the offshore energy sector.

Policy Framework

For the public, the main interest in offshore activities usually focuses on the associated 'benefits', often referred to as the Canada benefits or Nova Scotia benefits. The Canada-Nova Scotia Offshore Petroleum Resources Accord and the implementation Acts, which provide the main policy framework for offshore exploration and development, stipulate that Nova Scotia industry must be given a "...full and fair opportunity" to compete for contracts. The Acts do not stipulate what "full and fair" means, nor do they set any targets for Nova Scotia participation. Hence, there is little guidance available for the development of criteria by which to assess whether Nova Scotia has done better, worse or about what could be expected. The "Benefits Plan", which must be submitted for any exploration or field development, expresses an operator's commitment to the principles of providing "full and fair opportunity and first consideration in procurement, employment research and development" for Nova Scotians. It is up to the Canada-Nova Scotia Offshore Petroleum Board to review and accept the Benefits Plans submitted by operators and then monitor the results of implementation. The economic impacts analyzed in this study are based on the data and other information developed through this process.

Rationale for the Study

The decade of the 1990s provided the first real taste for Nova Scotia, albeit on a modest scale, of what offshore oil and gas project development could be. Over this time, the public analysis in the media has not been systematic as it relates to the economic impact on Nova Scotia of offshore projects through their exploration, development and production phases. This report provides the first fully documented account that describes what the economic impact has been.

The purpose and objectives of this study are:

- to prepare a comprehensive, documented report that describes and quantifies the economic impact that development and production of offshore oil and gas has had on the economy of Nova Scotia over the period 1990-2000, and
- to provide an assessment of lessons from this experience to support provincial planning in the future.

As a comprehensive examination of the Nova Scotia experience, this report is meant to provide a useful reference document to improve public understanding and to support the planning initiatives by the government of Nova Scotia as the province moves into its second decade of offshore energy development and production.

Offshore Projects

By the end of 2000, the Nova Scotia offshore had produced two actual project developments over the decade of activity reviewed. The Cohasset-Panuke project was a small oil field development, which led to oil production of about 7.2 million cubic meters (45 million barrels), over a seven-year period beginning in 1992. The oil was exported for processing in European and US markets. The Sable Offshore Energy Project (SOEP) started to produce natural gas at almost the same time as Cohasset oil production ceased in 1999. The SOEP is expected to produce gas at a rate of about 15.6 million cubic meters (550 million cubic feet) of gas per day and about 3,180 cubic meters (20,000 barrels) per day of natural gas liquids with a projected production life of about 25 years. The production period could be longer, if additional commercial gas fields are found to augment the currently identified reserves.

Impacts: Expected and Actual[50]

An important point to consider is how closely the estimated economic impacts of an activity or project, based on information from the planning and review stage, match the actual impacts realized when the activity or project was implemented. Table 10-1 shows that for the Nova Scotia offshore activities or related activities during 1990-2000, where both expected and actual impact estimates are available, the actual impacts exceed the expected impacts in all cases except the Maritime & Northeast Pipeline (M&NP) laterals. For example, for the SOEP, expected spending

[50] Expected refers to ex-ante impact estimates made using planned expenditures for a project or activity before the project has been implemented. Actual refers to ex-post estimates of economic impact based on actual expenditures reported for a project or activity.

was estimated at $1.6 billion of which $547 million would be placed in Nova Scotia. The total expected GDP impact was estimated at $590 million with associated employment impact of 11,100 person years. Actual development spending is reported at almost $2.3 billion,[51] of which $712 million occurred in Nova Scotia. It is not surprising, therefore, that the actual GDP impact ($773 million) and employment impact (14,460 person years) exceeded the expected impacts. A similar result occurred for Cohasset-Panuke and the M&NP main pipeline. The exception is the M&NP laterals where actual GDP ($67 million) exceeded expected GDP ($52 million), while actual employment (820 person years) was less than expected employment (985 person years)[52]. There are no documented expected impact estimates for the exploration activities. The actual exploration impacts are included for ease of comparison with the other activities.

Table 10-1
Economic Impacts for Nova Scotia Offshore-related Projects
Expected and Actual, 1990 – 2000

	Cohasset-Panuke		SOEP		M&NP Main Pipeline[5]		M&NP Halifax, Point Tupper Laterals		Exploration	
	Expected	Actual	Expected	Actual	Expected[3]	Actual	Expected	Actual	Expected[3]	Actual
Development										
Expenditure[1] ($ million)										
-Total	160	498	1,600	2,282	544	743	75	93	na	280
-Nova Scotia	60	184	547	712	na	183	42	53	na	93
GDP ($million)	34	212	590	773	98	231	52	67	na	81
Employment (person years)	1,250	3,080	11,100	14,460	810	2,770	985	820	na	1,300
Operations										
Expenditure ($ million)										
-Total	71	110	64	133	na	na	na	na	na	na
-Nova Scotia	23	43	47	67	na	na	na	na	na	na
GDP ($million)[2]	14	50	50	81	na	na	na	na	na	na
Employment (person years)	140	700	1,030	1,670	na	na	na	na	na	na

Source: Gardner Pinfold Consulting Economists Limited

Notes:

1. The expenditures and impacts of the projects were reported sometimes in constant dollars and sometimes in current dollars. This distinction is ignored here because the 1990s was a decade of relatively low inflation (applies to Cohasset-Panuke) or the Expected and Actual impacts are close in time (SOEP, pipelines).

2. This comparison excludes the direct impact of the net sales of oil, natural gas and natural gas liquids since these were not part of the original Expected estimates.

3. The Expenditure figure covers the complete pipeline. No expected impacts are given for Nova Scotia. The Expected GDP and employment impacts only cover direct and indirect impacts unlike the Actual impacts which include direct, indirect and induced.

4. Reported for completeness, there were no Expected estimates made.

5. Expected pipeline employment impacts that were reported in terms of jobs have been converted to person years at the rate of 1.35 jobs per person year.

na - not available or not calculated.

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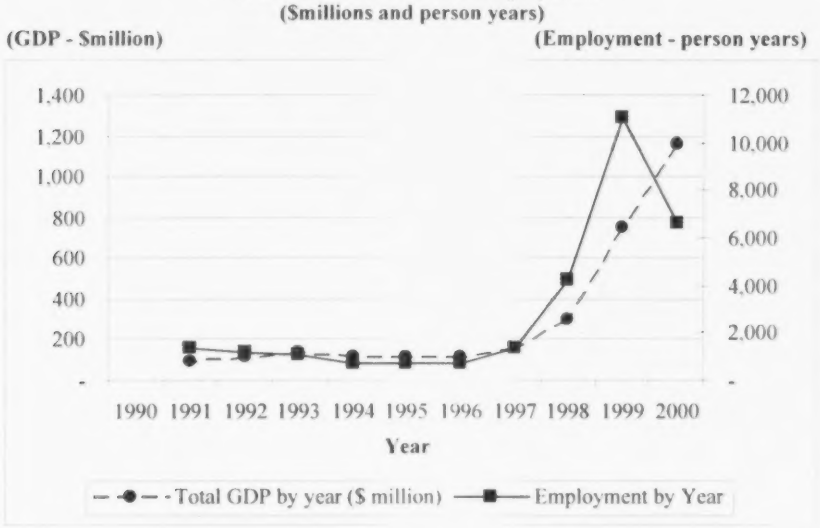
51 In the SOEP SEIS, it appears, although the wording is imprecise, that the $1.6 billion expenditure was meant to cover what are now called Tier 1 and Tier 2, that is the complete project. Now, ExxonMobil estimates that Tier 2 alone will be a $1 billion investment, bringing the total SOEP investment cost to about $3.2 billion, or double the original estimate.

52 This is largely explained by the use of a higher wage rate per person year and allowance for extensive overtime in the actual analysis (based on direct project knowledge) rather than the industry wide average wage used in the expected analysis.

Impacts over Time

Over the study period 1990-2000, offshore oil and gas activities in Nova Scotia consisted of a set of independent activities. These included the Cohasset-Panuke oil project, the SOEP and the construction of the main natural gas transmission pipeline and laterals to convey the SOEP gas to market, and some additional exploration drilling. The economic impacts of each of these activities were analyzed separately. Figure 10-1 shows the aggregate annual contribution of these activities to provincial GDP. Up to 1997, Cohasset-Panuke was the only offshore contributor to GDP, starting with the development phase in 1991 and increasing gradually to 1993 where the combination of operations spending plus some development expenditure created an interim peak in GDP. From 1994 to 1996, GDP contribution stabilized at close to $120 million, until the effects of SOEP begin to show up in 1997. Then the GDP contribution increased quickly as a result of the combined effects of SOEP construction, pipeline construction and exploration activity in 1998 and 1999, making the wind down of Cohasset-Panuke in 1999 hardly noticeable. The peak GDP during the study period was almost $1.2 billion in 2000. This coincided with the first full year of SOEP production when GDP contribution was dominated by the sales value of natural gas and natural gas liquids. Employment followed a similar pattern up to 1998 and topped out at over 11,000 person years in 1999 when the peak in SOEP construction coincides with construction of the M&NP main pipeline. Employment drops back to about 7,000 person years in 2000, when SOEP production began. About one-half of this employment was generated by SOEP development work and a little over 25% by SOEP operations. The rest came from the MN&P laterals and exploration work.

Figure 10-1
Offshore Oil and Gas Projects
Contribution to GDP and Employment
($millions and person years)



Source: Gardner Pinfold Consulting Economists Limited

Impacts in Economic Context

In 2000, the first year of natural gas production, the estimated annual direct contribution to Nova Scotia GDP by the SOEP was about $810 million, of which $780 million is the estimated net sales revenue after operating costs. Since most of this net revenue accrues to the non-resident owners outside the province, it passes through the provincial economy without registering any substantial spinoff impacts. The total annual in-province impacts during production are estimated at about $81 million. Over 25 years, the present value of these impacts, measured at a 7% discount rate, exceeds $940 million[53], a figure that easily exceeds the total development phase GDP impacts of $770 million. This confirms the frequent observation that, because of their long duration, the total production phase impacts will normally exceed the development phase impacts.

Taken on their own, both the development impacts ($770 million) and production impacts ($810 million) of SOEP are large. To put them in perspective, it is useful to recall that the annual GDP for Nova Scotia grew from $18.3 billion in 1997 to over $20.3 billion in 2000, the same time

[53] For this calculation we have assumed that the annual impacts will remain steady over the 25-year period. To the extent that operations spending increases or decreases, and the Nova Scotia content of that spending increases or decreases, the present value will increase or decrease.

frame as the SOEP impacts occurred. In 2000, the traditional primary industries – agriculture, forestry and fishing – contributed about $520 million to provincial GDP. This study estimated the direct contribution to GDP by natural gas production to be almost $810 million in 2000 (about 4% of GDP). So, in its first year of production, the SOEP GDP contribution exceeded the traditional primary industries. Assuming stable gas prices, the gap can be expected to widen further, as gas production increases to higher levels in the future. Still, natural gas production has yet to develop the backward linkages (use of other Nova Scotia produced goods and service inputs) and forward linkages (use of gas as feedstock for other petroleum products) that have been built up over time by the traditional primary industries. Hence, in spite of its quick emergence as the dominant contributor of direct GDP from the primary sector, the offshore oil and gas industry still has some way to go before it is highly integrated into the Nova Scotia economy.

The major employment impacts of offshore activities occurred during the development phase and lasted only one or two years. SOEP production phase direct employment runs at about 310 people. This compares with direct employment at each of the three Michelin plants employs, which exceeds 1,000 people or direct employment at the Stora Enso mill in Port Hawkesbury at 850 mill and woodlands workers and a further indirect employment of 700 more people in wood suppliers, truckers and so on.

In addition to the income and employment impacts, the provincial government has collected royalties and tax revenues directly from project operators/owners and some municipal governments have collected property tax revenues. Over the study period, 1990–2000, total provincial tax collections directly attributable to the offshore activities amounted to a little over $53.8 million, of which royalties provided $32 million. Nova Scotia retained slightly more than $35.2 million on a net basis, after allowing for the equalization offset. This is a lower bound figure since it does include the tax revenues related to spinoff effects.

Table 10-2 reports an upper bound for estimated gross provincial tax revenue from the income and employment impacts over the study period at $211 million. About 47% of the revenue or $99 million was generated directly by the various offshore activities analyzed in this report. These include the SOEP, the Cohasset-Panuke project, the Maritimes & Northeast Mainline and Laterals projects, the Deep Panuke project and other exploration drilling. The remaining 53% came from the spinoff activities. About 48% of the revenues came from personal and corporate income tax collections, while the HST provided another 30%. Other provincial taxes accounted for the rest.

Table 10-2
Provincial Tax Revenue: Total and by Source
($ million)

	Direct	Spinoff	Total
Total Provincial Revenue	99.0	112.1	211.0
Sources:			
Personal/Corporate Income Tax	44.6	56.0	100.6
HST Revenue	31.9	31.6	63.5
Other Indirect Tax Revenue	22.5	24.5	46.9

Note: These estimates do not include the royalty collections that are discussed separately. The figures are gross estimates made by the Nova Scotia Input-Output Model and do not make any allowance for equalization offset effects. They also do not include the effects of the input tax credit that would reduce the net HST revenues. They thus provide an upper bound estimate for tax revenues.

Municipal property taxes generated by taxing the gas pipelines amounted to $6.5 million in 2000 and increased to $10.1 million in 2001. The assessed value of the gas plant and the fractionation plant has been appealed, and a decision is pending.

Nova Scotia Content

The current policy framework provides a loose set of rules to guide offshore developments. The central feature is the Canada-Nova Scotia Accord Act that requires offshore operators to provide full and fair opportunity for Nova Scotia businesses to participate in offshore developments in the province. The Act provides no definition of the meaning of full and fair opportunity, leaving it to be interpreted by the Canada-Nova Scotia Offshore Petroleum Board. The results to date indicate that application of the current rules has led to 30-40% Nova Scotia content during the development stage expenditure and 35-50% Nova Scotia content during the production phase. Presumably this level of participation could increase in future developments as Nova Scotia businesses gain more experience with the offshore and Nova Scotia's capabilities to supply goods and services and skilled labour are enhanced.

Other than through its participation in appointing members to the Board, the Government of Nova Scotia has few, if any, direct policy tools that it can apply in the interests of achieving greater Nova Scotia content. So far, its main options have been moral suasion on the companies to expand Nova Scotia content and the execution of two side agreements. Under these agreements, the companies have agreed to contribute funding to the marketing of cheaper gas in Nova Scotia ($20 million) and funding of some infrastructure assets used by the offshore-related companies ($14 million).

It is important to remember that focusing too tightly on the short run Nova Scotia content figures may lead observers to miss other important benefits of the offshore. The offshore has been the source of important business opportunities for some Nova Scotia companies to provide goods and services to local offshore developments, as well as provide the base for these companies to expand into export markets. This helps to diversify the markets geographically for these companies, allows them to gain valuable experience in other offshore petroleum development and positions them well to participate in any future offshore petroleum development in Nova Scotia.

The key point is to note that the intermittent or cyclical nature of the Nova Scotia offshore so far means that few businesses could exist on offshore work alone. Indeed, development of additional commercial fields is essential before Nova Scotia could be said to have an offshore industry, rather than a series of offshore projects.

The SOEP partners and their contractors have devoted considerable resources to internal training for the SOEP. Government has also allocated substantial resources to training to fill perceived gaps in the skills of the existing labour force and to upgrade existing skills. For example, courses were put on to train welders up to the standard of 'down hand' welding to operate the automatic welding machines used in laying the natural gas pipelines. When the pipeline construction did not proceed on the expected schedule, many of these welders left the province to take up jobs in Alberta. This is not say that they will not return to Nova Scotia when appropriate job opportunities arise, but it does point out the risks in training for jobs whose timing is both uncertain and of short duration.

Estimates made in this report indicate that over 90% of the value of contracts awarded to Nova Scotia companies for SOEP ($731 million out of $795 million at the end of 2000) went to companies and organizations located in the Halifax Regional Municipality. The most notable other impact areas are Guysborough County, where the offshore pipeline landfall and the gas processing plant are located, and the Mulgrave-Port Hawkesbury area, where the liquids fractionation plant is located, as well as an offshore supply vessel base and machine shop.

Adequate Information

Information for the public to assess the real economic impacts of offshore development in Nova Scotia is relatively scarce. Even for this study it was necessary to make assumptions at various points in the analysis to supplement the data that were available, since they were, alone, insufficient to conduct the economic impact analysis.

During the planning stage for any offshore-related project, the various regulatory requirements generate public information. This includes the reports submitted to the Environmental and Socio-Economic Impact Assessment hearings, to the National Energy Board for pipeline approval and rate setting, and to the Canada-Nova Scotia Offshore Petroleum Board for its various license, permits and the Canada-Nova Scotia benefits process. All of this is planning-stage information that informs the public about the expected nature of the project and its impacts.

Once an offshore project becomes operational in Nova Scotia, there are relatively few sources of information for the public interested in monitoring the actual impacts and benefits produced. The main source is the Canada-Nova Scotia Benefits reports that provide a general description of actual spending and employment broken down into Nova Scotia, other Canadian and foreign content. This is all reported in aggregate terms. Since there are no targets set for Nova Scotia content in either aggregate or specific terms, the only measure is to compare actual results with the planning-stage estimates. This is the approach used in this study.

Looking to the Future

It is worth noting that Cohasset-Panuke and SOEP are the only Nova Scotia developments to have reached production so far, a process that has taken between 20 and 30 years following the initial discoveries of oil and gas. Since very little exploration work took place during the 1990s other than what was associated with the SOEP and the Cohasset-Panuke projects, the next stage of offshore development in Nova Scotia will in fact be extensions of those two projects. The Deep Panuke project will produce sour gas from deep gas fields that lie beneath the original Panuke oil field. Unlike Cohasset-Panuke and SOEP, however, it is expected that the lag between discovery and production for Deep Panuke will be about six years, assuming that current projections for proceeding with the development phase remain valid. The expansion of the SOEP will occur during 2003-2007 as the next fields – South Venture, Glenelg and Alma – are brought into production. Further development of the Nova Scotia offshore depends on successful exploration programs finding additional commercial gas or oil reserves.

To that end, a new round of exploratory drilling has started. If the previous projects are any guide, there could be a considerable lag before any new fields are brought into production to join the SOEP and Deep Panuke fields. Until this happens, the Nova Scotia offshore will remain at an early stage of development, characterized by periodic developments occurring with too much lag between them for a mature, sustainable offshore industry to be established based on the local

market alone. Even so, the industry experience gained over the last decade of the 20th century and the early 21st century has provided a solid base on which to build the future industry.

Recommendations

This study examined the economic impacts of the exploration, development and production of offshore oil and gas on the economy of Nova Scotia over the period 1990-2000. The findings of the study lead to the following two recommendations.

1. ***As an equal partner in the Canada Nova Scotia Offshore Petroleum Board, Nova Scotia should work to persuade the Board that more appropriately aggregated information on the spending for offshore work be made accessible for the conduct of comprehensive analysis of the economic impact of the offshore energy sector.***

This study found that most of the information for the offshore was available in highly aggregated format. Only through a variety of sources and background analyses could the aggregate spending information be broken down to the relevant industry and commodity level for economic impact analysis. And yet to monitor the extent of Nova Scotia participation at the industry sector level requires actual spending information at that level rather than just in aggregate terms. Better information at the commodity and industry sector level would support the creation of an expenditure template that could be applied consistently across projects and would facilitate comparisons across projects. This would allow the public to be better informed on the actual impacts that Nova Scotia realizes from its offshore resources, how these impacts have changed over time and how they have been distributed regionally.

It will also be important for the government to assess the success of its long-term offshore development strategy, which is based on increasing Nova Scotia participation in offshore activities by improving Nova Scotia's capacity and capabilities to participate in the offshore petroleum industry. This relates to the principle stated in the recently released Nova Scotia Energy Strategy, *Seizing the Opportunity*, regarding provincial involvement in offshore projects:

> "Nova Scotians should be the primary beneficiaries of the industrial benefits and revenues generated by the province's energy resources. These benefits should be distributed as widely as possible throughout the province."

The Strategy further refines primary beneficiaries to mean matters of employment and training, industrial and business opportunities, and research and development. The vehicle for implementing this principle is a device called an *Offshore Strategic Energy Agreement*. Such agreements will be entered into voluntarily between project proponents and the Province,

presumably in the spirit of the Accord to provide "full and fair opportunity" and to help build local capacities to participate in and capture the benefits of offshore petroleum-related work. How, and how well, these proposed agreements will work on future projects is uncertain. But what is clear is that without an adequate monitoring framework, evaluating the success of the strategic energy agreements will be very difficult.

2. ***Create and maintain a set of offshore petroleum satellite economic accounts to get a true and complete picture of the importance of the offshore oil and gas sector to the Nova Scotia economy.***

Several factors underlie this recommendation. At the heart of the matter is the fact that the offshore petroleum sector in Nova Scotia is not a well-defined industry that can be easily identified in the economic accounts tracked and produced by Statistics Canada. The situation is very similar to that of the tourism industry. Tourism is recognized as an important economic activity, but the spending, income and employment that it generates are spread across a mix of the industry sectors including accommodation, food and beverage services, transportation, gas and oil, recreation services, and retail services covering the purchase of gifts and souvenirs. The economic accounts do not have an entry for the "tourism industry" itself. For the offshore, spending activities are also captured in various industry sectors, such as oil and gas extraction, services incidental to mining, transportation and warehousing, wholesale activities, business services (which includes engineering services). The solution we are suggesting for the Nova Scotia offshore is to parallel what has been done for tourism: create a satellite offshore petroleum economic account that will give a comprehensive picture of offshore and offshore-related economic activity in the Nova Scotia economy.

Another factor is that the current methods for tracking offshore economic activity are incomplete. The data accessible to this study capture the economic impacts of offshore-related projects implemented in Nova Scotia over 1990-2000. However, these are not all of the impacts of offshore-related activities in Nova Scotia. The possible reasons include:

- The Canada-Nova Scotia Offshore Petroleum Board only reports on projects that it has approved.

  Consequently, pre-project spending related to the early stages of engineering and planning or the preparation of Environmental and Socio Economic Impact Statements may not be fully captured.

- Construction of and repairs to offshore rigs and equipment unrelated to a specific Nova Scotia project will not be captured in the Board's project data.

Completion of the construction of the semi-submersible rig Eirik Raude in Halifax illustrates the issue. This economic activity will be captured but not isolated by Statistics Canada in its reporting of the shipbuilding industry. The economic impacts will not be captured in any accounting of offshore oil and gas activity in Nova Scotia unless and until the rig is used for exploration or development drilling in the province. Even then, much of the impacts will not register in Nova Scotia since the rig is foreign-owned and its lease payments will be counted as direct imports. Canada-Nova Scotia benefits reporting will capture employment of Nova Scotians and local purchases of goods and services. The situation would be similar for offshore supply boats built in the Halifax Shipyard or other Nova Scotia yards, depending on the ultimate ownership of the vessels.

- Head office activities may not be reported as part of project expenditure.

  Head office functions typically begin prior to a recognized project as, for example, has been the case with the most recent round of exploration activity in Nova Scotia. The head office may cover regional functions, such as the ExxonMobil head office that handles both the SOEP in Nova Scotia and the Hibernia oil project in Newfoundland. The activities of companies, such as Jacques Whitford and Secunda Marine, which are engaged in the export of services to offshore petroleum projects, will be included in business services.

Creating and maintaining satellite economic accounts would capture all of the offshore petroleum-related economic activity and give a complete picture of its importance in the Nova Scotia economy.

APPENDICES

Appendix 1

Appendix 1

Nova Scotia Capital Spending, 1991-2002
($million)

	Mining and Minerals				Transportation & Warehousing	Total Capital Spending
Year	Oil & Gas Extraction	Mining exluding Oil & Gas	Support Services	Total		
1991	276.1	107.4	4.5	387.9	109.2	3251.7
1992	150.4	68.1	2.8	221.4	138.6	2929.4
1993	49.7	61.8	1.7	113.3	165.7	2963.3
1994	5.4	62.1	1.7	69.2	161.3	3172.9
1995	9.1	41.6	2.6	53.3	118.8	3077.5
1996	30.8	50.7	9.1	90.6	164.9	3124.1
1997	100.2	41.1	8.5	149.7	158.1	4059.2
1998	1029.4	35.9	29.3	1094.6	329.3	4353.8
1999	1228.3	63.7	15.8	1297.9	506.1	5164.4
2000	630.8	51.4	15.1	697.4	236.2	4497.7
2001*	617.2	43.6	14.1	674.9	220.2	4316.2
2002**	722.7	61.9	40.9	825.5	203.1	4595.8

* Estimated

** Forecast

Source: Statistics Canada, CANSIM database
Prepared by Gardner Pinfold Consulting Economists Limited

Appendix 2

Appendix 2

Nova Scotia Input-Output Models

This study reports impact results generated by three different input-output models of the Nova Scotia economy: the 1984 model, the 1990 model and the 1996 model. The years referenced indicate the year of the economic data used to estimate a model's coefficients. Other than the economic data used, the main difference between the models is the level of sector detail at which they operate.

The models determine the impacts of an increase in final demand in Nova Scotia on industry output, income and employment. The assumptions and methodology underlying these models are outlined below.

Assumptions

All models of economic behaviour rely on simplifying assumptions. The following major assumptions underlie the Nova Scotia Input-Output Models.

- Limited Time Dimension: All impacts of a change in final demand are effective within whatever period of analysis is chosen. In this sense, the model is "static" and does not attempt to show the pattern of change over time.

- Limited Sensitivity to Relative Price Changes: All prices are fixed and do not change over time.

- Fixed Technology: Industries are assumed to operate using technologies used in their reference year; i.e.,1984, 1990 or 1996.

- Constant Returns to Scale: All inputs are assumed to change in the same proportion as any change in an industry's output.

- No Supply Constraints: Input-Output models assume that whatever is demanded by industries as inputs can be supplied. They assume no productive capacity constraints.

- Fixed Consumption Patterns: The consumption patterns that result in household respending multipliers are assumed to be fixed and linear. These do, of course, change according to the reference year of the model.

Operation of the Model

The input-output method is an empirical representation of a general theory of production based on the notion of economic interdependence. In an input-output model each industry in the economy depends upon other industries for the supply of intermediate goods. The model assumes that prices and wages are fixed, and the supply of both intermediate goods and final goods is unlimited.

The basic question traditionally asked in economic impact analysis is 'What are the gross-output and income flows associated with a specified economic change?' An input-output model provides the answer by tracing the transmission of a demand shock throughout the economic system. In this case, the shock takes the form of project expenditures; i.e., the expenditures made by Cohasset-Panuke or by SOEP. The impacts are usually estimated in terms of increases in incomes earned by resource owners (measured by GDP) and employment. Wages and salaries plus benefits are often reported as household income, essentially the labour income component of GDP.

These impacts are usually distinguished as direct, indirect and induced. *Direct impacts* refer to effects caused by the direct purchases of project inputs. *Indirect impacts* refer to income and employment effects arising from inter-industry purchases of goods and services, while *induced impacts* refer to the effects caused by consumer spending of incomes earned in direct and indirect activities.

The analysis uses *open* and *closed* versions of the Input-Output Model. The open model provides a measure of direct and indirect impacts. The effects of spending the household incomes earned in direct and indirect activities are not included in the analysis. In other words, they are treated as a leakage from the economic system. Alternatively, the closed model captures the full effects; i.e., the induced impacts, of spending the incomes earned at the direct and indirect stages on goods and services. To obtain a measure of induced impacts one may subtract the open model results (indirect plus direct impacts) from the closed model results (indirect, direct and induced impacts).

For the development phase, the model reports the impacts arising from total capital expenditures. For the sake of simplicity, impacts are reported as though they occurred at a single point in time. In reality, they would be spread over the project life and beyond, allowing for some lags in the spending cycle. Impacts for the production phase are based on a single year's expenditure, and consequently represent the impacts related only to a *typical year* (at peak production). These impacts would be recurrent for as long as production lasts.

Appendix 3

Appendix 3

Change in Valuation from Factor Cost to Basic Prices

Since its inception, GDP by industry has been measured at factor cost. This measure differs from the more prevalent market price measure found in the income and expenditure accounts by its exclusion of taxes on production (formerly called indirect taxes) and the inclusion of subsidies. While the market price measure represents the value of GDP as paid for by final consumers, the factor cost measure, more appropriately in the case of industrial production, takes the point of view of producers.

With this revision, value added will no longer be measured at factor cost, but instead at basic prices. This new measure adds to the factor cost measure some taxes on production (such as property and payroll taxes, but not federal or provincial sales taxes), and subtracts some subsidies (such as labour-related subsidies, but not product-related subsidies). The end result is that the new basic prices measure of GDP stands somewhere in between the lower and upper bounds defined by the factor cost and market price measures, respectively (see table).

GDP at factor cost excludes all taxes on production and includes all subsidies whether they are on intermediate inputs or labour and capital. In the basic price approach only taxes and subsidies on intermediate inputs are treated in this manner. Payroll taxes are payments to government arising out of the input of labour services, and property taxes are levies on the capital services of buildings and other property. They are both part of production and are included in the basic price measure. On the other hand, subsidies to labour and capital are deducted from the gross revenues of these factors as they are payments by governments rather than earnings.

By calculating GDP by industry at basic prices, Statistics Canada makes its estimates of economic activity more comparable to those produced by a majority of other OECD countries.

The difference between the three measures can be illustrated using data from the 1997 Input-Output tables in constant prices for total GDP.

1.	Value of output at modified basic prices for total economy (in billions):	$1,664
2.	Plus value of subsidies on products	8
3.	Less value of intermediate goods at purchasers' prices (including taxes) equals	
4.	**Gross Domestic Product at basic prices**	817
5.	Less other taxes on production (i.e., excluding taxes on products)	49
6.	Plus other subsidies on production equals	
7.	**Gross Domestic product at factor cost**	769
8.	Plus net taxes on production (taxes less subsidies) equals	116
9.	**Gross Domestic Product at market prices**	885

Source: Statistics Canada, http://www.statcan.ca/english/concepts/SNA/valuation.htm

Appendix 4

Appendix 4

Gross Domestic Product versus Gross Provincial Product

The present system of national income accounting uses both a 'national' and a 'domestic' concept to report on economic production. At the provincial level, the Gross Provincial Product (GPP) measures the earnings of all Provincial factors of production regardless of where they are located, that in the province or elsewhere. The Provincial Gross Domestic Product (PGDP) measures only the production originating within the geographic boundaries of the province, whether provincial residents or non-residents own the factors of production. The relationship between the two measures of aggregate provincial income can be seen in the following accounting identity:

Provincial Gross Domestic Product
Plus: Income receipts from the rest of the world
Less: Income payments to the rest of the world
Equals: Gross Provincial Product

In today's world the conventional practice is to report aggregate economic income in terms of Provincial Gross Domestic Product. It is taken as the most appropriate measure of economic activity within the province's borders. However where there is an imbalance between income receipts and income payments, PGDP and GPP will differ and perhaps substantially.

Offshore oil and gas production is a case in point. In Nova Scotia, non-residents own the invested capital in the form of the platforms, pipelines and processing plants. In the case of SOEP, for example, the owners are large American-owned multinational corporations. For Cohasset-Panuke, except when Nova Scotia Resources Limited held a minority share, the capital assets were owned by non-residents, first by Lasmo, a British company, and later PanCanadian, an Alberta company. This means that all income payments in the form of return of capital (depreciation), return to capital (profit) will accrue to non-residents. (We are simplifying the discussion by ignoring the question of whether some part of the profit might be income payments in the form in interest or economic rent. If they are paid to non-residents, the effect is the same regardless of what they are called.) These income payments would be included in PGDP but excluded from GPP. Thus, for example, most of the income payments associated with the almost $900 million in net sales revenue that accrued in the year 2000, the first year of SOEP production, ends up being treated as income produced in the province but not income flowing into the hands of provincial residents. The exception is the income paid to those residents employed in the production operations.

This difference is important to understand since it helps to explain why a province could experience substantial gains in PGDP once gas or oil production begins with no apparent impact on employment levels. The income payments made to non-residents are in effect a leakage from the provincial economy and provide no on-going economic benefit to the province. Only the wages and salaries paid to the operating employees and other income payments generated through the local purchase of goods and services count in this regard. Of course, the province does capture additional revenues in the form of royalties, HST and corporate income tax as discussed in the Offshore Revenues section of this study.

Appendix 5

Appendix 5

Offshore Petroleum Royalty Regime

Overview

The Nova Scotia Offshore Petroleum Royalty Regime is based upon revenues and profits. The regime is designed to recognize the inherent risks involved in offshore oil and gas exploration and production. The regime provides arrangements for the current Sable Offshore Energy Project and the Cohasset-Panuke Project, as well as a generic formula for future projects. The generic royalty regime is explicitly designed to encourage risk-taking by offering lower royalties for the first project in a new area - a so-called "high risk project".

Authority

The Offshore Petroleum Royalty Act provides the authority for the government of Nova Scotia to put in place regulations that set royalty levels for oil and gas projects in the Nova Scotia offshore area. The Act also provides for royalty agreements to be put in place between offshore production license holders and the government of Nova Scotia. In July 1999, the government of Nova Scotia signed formal royalty agreements with each interest owner of the Sable Offshore Energy Project. At the same time, generic royalty regulations were put in place that would apply to future offshore oil and gas projects. The SOEP royalty regime and the generic royalty regime each stipulate that royalty will be a function of both the value of petroleum leaving a project boundary as well as profits associated with the operation of a project. Royalty is initially set as an increasing percentage of gross revenues before it switches to increasing percentages of net revenues. Royalty rates increase with project profitability. Once net revenue royalty levels are reached, royalty cannot be less that a specified level of gross revenues.

Royalty Terminology

Gross Revenues (GR):	The value of petroleum leaving the boundary of an offshore project.
LTBR:	Long Term Government of Canada Bond Rate (10 year).
Net Revenue (NR):	The gross revenue of a project less the costs associated with getting the petroleum to the project boundary.
Return Allowance (RA):	A percentage of unrecovered project costs. Once simple payout is achieved, the return allowance ceases to be calculated.
Simple Payout:	The point at which project revenues first reach or exceed the sum of allowed exploration costs, capital costs, operating costs and royalties paid. Corporate income tax is not an allowed cost for royalty purposes.

Sable Offshore Energy Project Royalty Regime

Gross Revenue Royalty

Tier 1 - 1% GR, 36 month period

Tier 2 - 2% GR, until simple payout + RA based on 5% + LTBR

Tier 3 - 5% GR, until simple payout + RA based on 12.5% + LTBR

Net Revenue Royalty

Tier 4 - 30% NR, until simple payout + RA based on 45% + LTBR *

Tier 5 - 35% NR *

* minimum of 1% or 5% of GR payable depending on average gas price.

Generic Royalty Regime

"BASE REGIME"

Gross Revenue Royalty

Tier 1 - 2% GR, until simple payout + RA based on 5% + LTBR

Tier 2 - 5% GR until simple payout + RA based on 20% + LTBR

Net Revenue Royalty

Tier 3 - 20% NR until simple payout + RA based on 45% + LTBR *

Tier 4 - 35% NR *

"SMALL OIL"

Gross Revenue Royalty

Tier 1 - 2% GR until later of 2 years or simple payout + RA based on 5% + LTBR

Tier 2 - 5% GR until later of 3 years or simple payout + RA based on 20% + LTBR

Net Revenue Royalty

Tier 3 - Same as Tier 3 of BASE REGIME *

Tier 4 - Same as Tier 4 of BASE REGIME *

"HIGH RISK"

Gross Revenue Royalty

Tier 1 - Same as Tier 1 of BASE REGIME

Tier 2 - Same as Tier 2 of BASE REGIME

Net Revenue Royalty

Tier 3 - 20% NR *

* Minimum of 5% GR payable

For projects that fall under the Base Regime, only successful finding costs are allowed costs for royalty purposes. For projects that fall under the Small Oil or High Risk regimes, in addition to successful exploration costs, unsuccessful exploration costs associated with the project may be allowed costs for royalty purposes.

Appendix 6

Appendix 6

Skill Transfer Projects Funded by Nova Scotia Government, 1998-2000

	Estimated Training Cost	Provincial Contribution	NS % of Funding
Specialized Labour Techniques for pipeline construction	$240,000	$60,000	25%
Training and hiring of 20 Nova Scotians for Santa Fe Drilling Company	$341,168	$170,584	50%
Engineering Training for East Coast Offshore Alliance in the United Kingdom	$202,062	$107,612	53%
Engineering Training for Martec Limited at Brown and Root in Houston	$283,501	$212,626	75%
ROV and Diving training for Dominion Diving Limited	$247,720	$113,860	46%
Dynamic Positioning training for Secunda Marine Services Ltd.	$410,298	$205,149	50%
Training of Fireproofers for Parker Brothers Contracting Ltd.	$183,984	$137,988	75%
Instructor training for Survival Systems Guysborough County Training Center	$163,860	$122,895	75%
Dynamic Positioning training for Kongsberg Simras Mesotech Ltd.	$93,360	$46,680	50%
Ultrasonic, Lifting Gear and Industrial Rope Access Trade Association training for TJ Inspection Services	$49,600	$37,200	75%
Upgrading of welders at MM Industra	$15,200	$7,600	50%
P.V. Offshore Inc to upgrade their personnel in Pipe Inspection Techniques	$70,552	$42,331	60%
RTD Quality Services Inc to train staff on Pipe Inspection Techniques	$93,329	$69,997	75%
Mulitbeam Sonar Course in Ontario for Canadian Seabed Research of Porters Lake	$16,540	$12,405	75%
Engineering Training in the United States for ACCENT engineering	$17,833	$8,916	50%
Upgrading of staff at Bridgeport Wire & Rope for Teaching Inspection Courses	$6,648	$4,986	75%
Total	$2,435,655	$1,360,829	56%

Source: Nova Scotia Department of Energy

Appendix 7

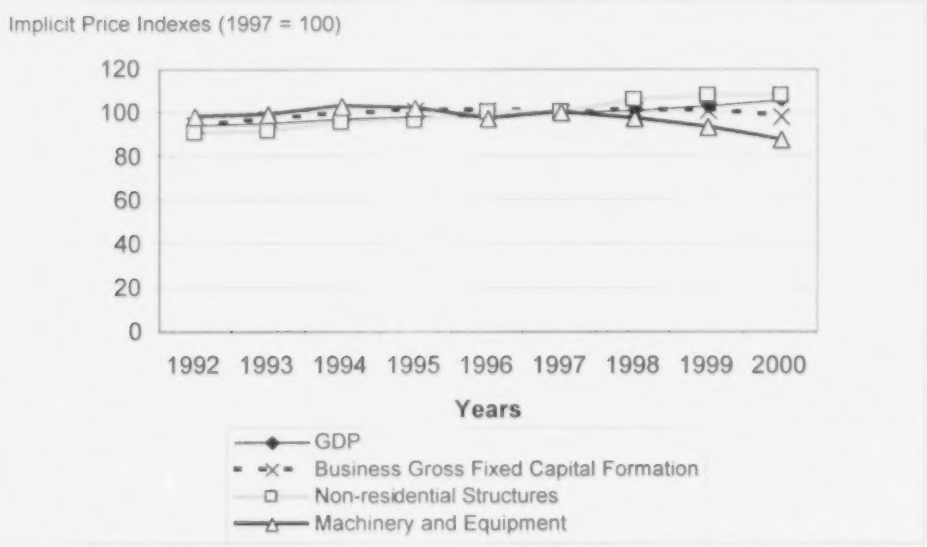
Appendix 7

Current versus Constant Dollars

The expenditure figures reported in this study are expressed mainly in current dollars. That is, they reflect the prices in the year in which the expenditure occurred, unless otherwise noted. The exceptions apply to the *ex-ante* economic impact estimates that were reported in a mix of constant dollars; that is, net of any inflation effects. Since the study period spans the decade 1990-2000 (actually 11 years) and the offshore activities analyzed are spread across the period, it seems reasonable to ask whether or not the actual expenditure figures should be expressed in current dollars (including any inflation over the study period) or constant dollars.

This study chose to use current dollars mainly because the decade of the 1990s was a period of very modest inflationary pressure. Any adjustments made to convert from current dollars to constant dollars would make little or no difference to the conclusions flowing from the analysis. Figure A7-1 shows the values of the Nova Scotia implicit price indexes for GDP and three of its components: Business Gross Fixed Capital Formation, Non-residential Structures and Machinery and Equipment. It is evident that none of the indexes shows a strong upward trend.

Figure A7-1
Implicit Price Indexes, Gross Domestic Product and Components
Nova Scotia, 1992 - 2000



Source: Statistics Canada, *Provincial Economic Accounts*, Catalogue No. 13-213, Preliminary Estimates 2001.

The GDP index has increased at an average annual rate of about 1.5% (Table A7-1). The Business Gross Fixed Capital index increased by about 0.5% per year, the result of the increase in the Non-residential Structures index (2.5%) and the decline in the Machinery and Equipment price index (-1.3%). The increase in the Structures index tends to coincide with the construction phase of the SOEP but this offset by the decline in the Machinery and Equipment index over the same period. All things considered, the use of current dollars will give a good representation of the real economic impacts of the offshore expenditures during the study period.

Table A7-1
Average Annual Increase in Selected Implicit Price Indexes
1992 - 2000

GDP	Non-residential Structures	Machinery and Equipment	Business Gross Fixed Capital Formation
1.5%	2.5%	-1.3%	0.5%

Source: Statistics Canada, *Provincial Economic Accounts*, Catalogue No. 13-213, Preliminary Estimates 2001.

Appendix 8

Appendix 8

Gross versus Net Impacts

The income and employment impacts estimated by the Nova Scotia Input-Output Model are gross impacts. That is, they do not take into account any displacement effects associated with the use of Nova Scotia resources by offshore activities. Adjusting for any displacement effects would reduce the spinoff impacts to yield net impacts. There are several types of displacement effects to consider.

- Safety-net Effect: this refers to the effect of the project creating employment for previously unemployed people. Some of the spinoff impacts are the induced effects generated by the spending of incomes earned that are attributable to the project being analyzed. The actual increase in income depends on what income the people employed by the project had before the project. The alternatives are unemployed with no income and unemployed with income from employment insurance or other forms of income assistance. To the extent that people are drawn into project-related employment from employment insurance supported unemployment, the induced income effects attributable to a project are reduced and net impacts will be less than gross impacts.

- Substitution Effect: this effect refers to previously employed people who were earning a lower income than their project-related income. The incremental income that fuels the induced effects depends on two factors. First is the gap between project-related income and previous income; the greater the gap in income, the greater the effect. Second is whether or not the people switching jobs (moving to the project-related jobs) are replaced in their old positions. If all job switchers are replaced, then the project related income is completely incremental. The incremental effect decreases to the extent that job switchers are not replaced.

- Crowding-out Effect: this refers to a situation where offshore activities use resource inputs that are denied to other Nova Scotia companies engaged in non-offshore economic activity. (Note that the labour Substitution Effect could be subsumed under this effect in some cases.) Hence, to the extent that crowding out occurs, the gains in income and employment from offshore activities are offset by losses in the crowded-out activities.

The main issue is that these effects are conceptually easy to define but empirically difficult to measure. The required data are not readily available for several reasons:

- The information is not collected; or,

- The information is collected but interpreting it would require personal or company-level interviews to track the pre-project status of the previously unemployed or the extent to which replacement occurs for the job switchers; or,

- It may be impossible for companies to know whether crowding out is the reason they are unable to acquire the labour and other inputs they want, or it simply may be the result of an otherwise strong economy.

Another way of approaching the issue is to ask whether crowding out is likely to be an important factor during the construction phase and operations phase of an offshore project. Generally, for the Nova Scotia offshore projects during 1990-2000, the answer appears to be no.

- Cohasset-Panuke: the original economic impact study examined the crowding-out effect implicitly by analyzing the extent to which Nova Scotia could supply the materials, services and labour to build and operate the project. Its general conclusion was that the project could be easily accommodated within the existing structure of the Nova Scotia economy. The original plan called for a five-year construction phase peaking in 1991. In fact, development expenditure started in 1991 with 1991 and 1992 registering spending in excess of $100 million, with about 37% Nova Scotia content. Development spending continued through the 1990s at considerably lower levels. Operations spending averaged about $110 million with about 39% Nova Scotia content. At these levels of expenditure, there seems little reason to believe there was any substantial crowding-out effect related to this project.

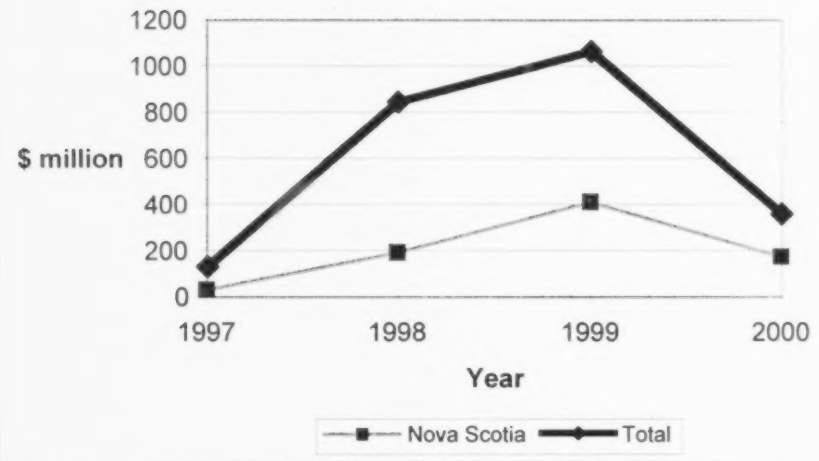
- SOEP: in terms of development expenditure, the SOEP is more than five times the size of the Cohasset-Panuke project (excluding the Deep Panuke drilling expenditure), so the potential for crowding out would seem to be greater. However, a variety of factors were at work, some which would reduce the potential, others that would increase it.

As Figures A8-1 and A8-2 show, about 73% of Nova Scotia expenditure is concentrated in 1999 and 2000, allowing the suppliers to get prepared. The operations expenditure in 2000 was just the first year of a long-term spending stream. Suppliers and the rest of the economy would be able to adjust their operations to handle SOEP without displacing other business. There were no other offshore or large onshore construction projects bidding for the same inputs required by the SOEP. At the same time, the build-up in expenditure is very rapid, more than doubling in 1998 over 1997 and increasing yet again in 1999 over 1998. Experienced observers indicate that Nova Scotia companies faced a steep learning curve in dealing with the tight deadlines involved in offshore work. In these two years, one could expect some displacement effect to be operating. Overall, in our judgment the displacement effect generated by SOEP activities was not substantial although its magnitude is indeterminate.

This leaves the question of the strength of the Safety-net Effect and the Substitution Effect. Most of the jobs generated by SOEP during both the development phase and the operations phase require skilled or highly skilled labour (Figure A8-3). Historically these groups have had relatively low unemployment rates. This would suggest that the Safety-net Effect is relatively small. As for the Substitution Effect, it would be more likely to be strong if there were other projects in Nova Scotia bidding at the same time for the same skills as those required by the SOEP. This does not appear to have been the case. So although substitution effects cannot be ruled out, it does not appear that they would have been strong.

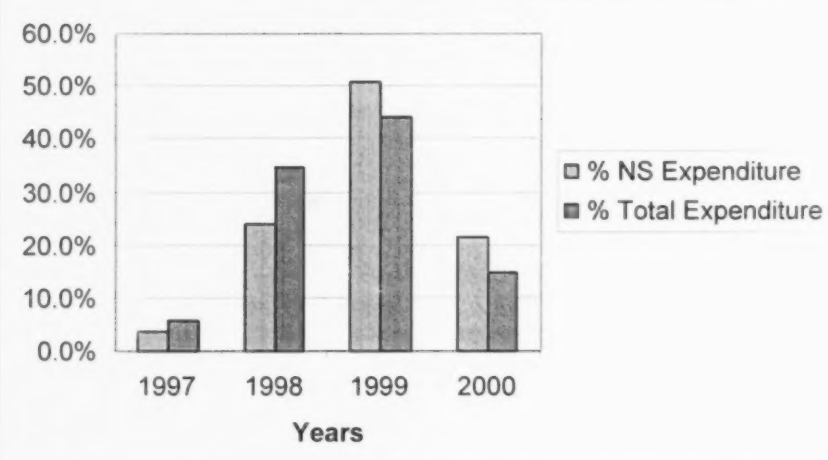
Similar conclusions would hold for the pipeline projects and offshore exploration work. Hence, all things considered, it seems reasonable to accept the gross impacts as a slight overstatement of the net impacts. Nevertheless, considering the data limitations faced by this study, the gross impacts provide an acceptable estimate of the net impacts.

Figure A8-1
Sable Offshore Energy Project
Nova Scotia and Total Expenditure by Year



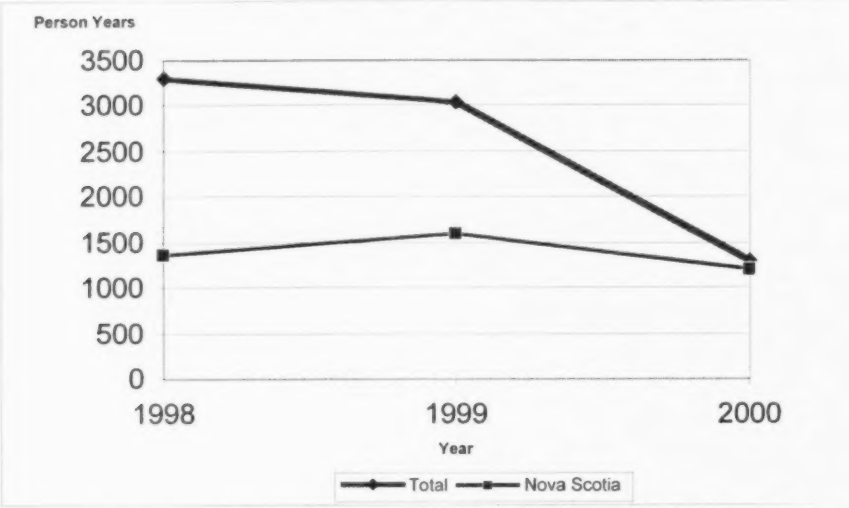
Source: Derived from Sable Offshore Energy Incorporated, *2000 Canada-Nova Scotia Annual Report*
Note: The 2000 figure includes both development and operations expenditure.

Figure A8-2
Sable Offshore Energy Project
Percentage Distribution of Annual
Nova Scotia and Total Expenditure



Source: Derived from Sable Offshore Energy Incorporated, *2000 Canada-Nova Scotia Annual Report*

Figure A8-3
Sable Offshore Energy Project
Annual Employment, Nova Scotia and Total



Source: Derived from Sable Offshore Energy Incorporated, *2000 Canada-Nova Scotia Annual Report*.
Note: 1998 employment is the sum of 1997 and 1998, 2000 employment is a combination of development and operations employment.

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